Contents

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. LVI. 1 AUGUST, 1941 Part 2

Event and Comment

Change from Butter to Cheese.

LIKE every other industry producing for export, the dairy industry is faced with a grave situation, but the proposed change-over from butter to cheese production will go a long way towards ensuring stability in present difficult circumstances.

Conditions brought about by the war constitute a challenge to dairy farmers and manufacturers alike. It is believed that one important outcome of the acceptance of this challenge will be the attainment of higher technical standards in dairy production. The need for turning out choicest quality cheese, as the obligatory transition in manufacture proceeds, is recognised by the dairy industry as imperative. If all concerned accept the principle on which the proposed swing-over is based and concentrate on the production of cheese of the highest quality attainable, it is believed that many practical and lasting benefits will certainly accrue to the dairy industry as a whole.

What is necessary at the present time is to preserve the basic structure of the land industries, so that when the occasion arises they may be able to change back to normal production and soon afterwards to increased production at even higher standards of efficiency.

In butter quality Queensland has built up a great reputation, and with our capacity for dairy production, almost boundless in its scope, both quality and volume are assured in ordinary circumstances. In annual value, our butter production alone has attained a peak of £10,000,000 in round figures, so the prospective swing-over from butter to cheesemaking in certain districts, the Darling Downs particularly, has not been lightly considered. Only the stern necessities of war have forced the change upon us.

Britain will take from us at least 40,000 tons of cheese in 1941-42—more than four times the volume of our shipments last year. Of that quantity, Queensland is asked to produce 20,000 tons for export, four times as much as we sent overseas during the same period.

As to butter, under the new agreement Britain will take about 60 per cent. of Australia's exportable surplus, which approximates 100,000 tons a year; and of that proportion only choicest and first-grade butter will be acceptable.

Under the dairy produce contract between Great Britain and the Commonwealth for 1941-42 the price for choicest and first-grade cheese has been fixed at 83s. 9d. per cwt. f.o.b., compared with 76s. 6¾d. for 1940-41. For second-grade cheese the price will be 81s. 3d., compared with last year's price of 74s. 0¾d. For third grade the price is 78s. 9d., compared with 71s. 6d.

The increased price is an inducement to suppliers to facilitate the change to cheese. Such a change cannot, admittedly, be made easily. There are obvious difficulties to overcome, but they are not insuperable. The plain fact is that butter producers are faced with the alternative of either reducing their output substantially or placing their surplus in cold storage for an indefinite and probably protracted period. A final quittance of stored butter may even be out of the question, if present war conditions continue or become worse. A substantial reduction has been forced on the industry, and this decrease can be balanced by a substantial increase in cheese output without financial disadvantage to the dairy farmer.

As for additional equipment required in the swing-over, inquiries show that ample material is available for all requirements of handling and manufacture.

A survey also has revealed that no other State is so well equipped as Queensland for a diversion from butter to cheese manufacture.

Already the diversion from butter to cheese is proceeding satisfactorily on the Darling Downs, although for many dairy farmers it means changing an established routine. However, in spite of transport difficulties and other inconveniences, the farmers involved are facing the altered situation—and the extra work—in a very fine spirit while realising, of course, the compelling force of circumstance.

The immediate necessity is to fill every available vat in every factory, so that our present cheese out-turn may be quadrupled. With existing manufacturing facilities last year's output can be doubled; by increasing factory equipment 5,000 tons more can be added; and by extending factory accommodation cheese production can be brought up to 20,000 tons, and that is the present objective.

Dairy Production—Disposal of Surplus.

ON their return from a meeting in Melbourne of the Commonwealth Dairy Produce Control Committee, the Queensland representatives, Messrs. T. F. Plunkett, M.L.A. (chairman), and Chris. Sheehy, stated that the committee had reached a number of important decisions in regard to the disposal of surplus butter and cheese to be produced in the season 1941-42. The British decision to take a greatly increased quantity of cheese while very substantially reducing butter purchases necessitated a large change-over from butter to cheese. Every ton of butter by which the unsold surplus was reduced must improve the position of the butter suppliers. Action in the direction of a change-over from butter to cheese had already been taken by the committee. A survey had been made of the possibilities of increases in cheese production in each of the States, and thanks to the active co-operation and assistance of the Minister for Agriculture and Stock (Mr. F. W. Bulcock) and his officers, the matter had progressed to quite a considerable extent in Queensland.

To achieve a maximum change-over, however, it had been recognised by all concerned that manufacturers and suppliers meeting the position must be assured of equitable treatment, and arrangements had now been completed to that end. Features of such arrangements in the case of manufacturers were:—(*a*) Loans to factories through usual channels on the guarantee, where necessary, of the Commonwealth Government. (*b*) Assurance to be given by the industry, through the Dairy Produce Control Committee, that manufacturers will be guaranteed against individual loss in meeting the change-over by having extensions and/or additional plant provided by them taken over by the committee on a basis of cost, less depreciation in the event of a slump occurring during the war or within a period of two years following the termination thereof; a fund to be provided by way of charge on contract butter for the year 1941-42 to the end indicated. (*c*) Expenditure in respect of which a guarantee was required from the committee must receive the prior approval thereof. (*d*) The committee to seek the further co-operation and assistance of State Ministers for Agriculture by having them associate themselves with State committees to be created for the purpose of advising on loans for purposes of the change-over. (*e*) The committee in dealing with loans to have full regard to the principle of keeping down capital expenditure by making the fullest use of existing manufactories and equipment and generally of confining expenditure to manufactories best suited economically for the purpose.

In the matter of equitable treatment of producers, relative values returned for butter and cheese would be carefully watched by the committee.

Discussing the question of second-grade and pastry butter, Messrs. Plunkett and Sheehy intimated that it was definite that these butters would not be accepted in the contract for the season 1941-42. A quantity of this butter was now marketed within the Commonwealth, mainly for culinary and manufacturing purposes. Manufacturers throughout the Commonwealth should make every endeavour without delay to reduce the output of these butters.

Poultry Farming in Queensland.

(*Continued from page 56, July, 1941.*)

THE AUSTRALORP.

Queensland Standard as adopted by the Australorp Society, the National Utility Poultry Breeders' Association (Queensland Branch), and the United Poultry Club of Queensland.

Head.—Medium in size; skull fine with no fullness over the eyes; beak of medium length, strong and slightly curved; colour black: 5 points.

Eyes.—Full, prominent and expressive, dark-brown iris, the darker the better: 5 points.

Comb, Wattles, and Lobes.—Medium size, smooth and fine in texture; bright red in colour; comb erect, evenly serrated, and following the curve of the head; wattles neatly rounded; lobes well developed: 5 points.

Face.—Bright red, fine, not sunken, and as free from feathering and wrinkles as possible: 5 points.

Neck.—Medium length; slightly curved, and profusely feathered.

Body, Skin, and Abdomen.—Body deep, broad-backed, and of good length, breast of medium depth, broad and nicely rounded, keel straight, and of moderate length, the whole giving a well-balanced appearance; wings well formed and carried close to body; skin, white texture of finest quality. The abdomen to be elastic and full, but avoiding indications of excessive fat or abdominal weakness: 35 points.

Tail.—Medium length, angle about 35 degrees in the male and 20 degrees in the female: 5 points.

Legs.—Medium length, strong, and wide apart; shanks fine in bone and scale, free from feather or fluff; toes straight and well spread; legs and upper portion of feet slate to black; sole of feet white: 5 points.

Plumage.—Soft, close, avoiding fluff and looseness; colour black, with green sheen: 7 points.

Condition.—As indicated by general health, cleanliness of feathers and legs: 10 points.

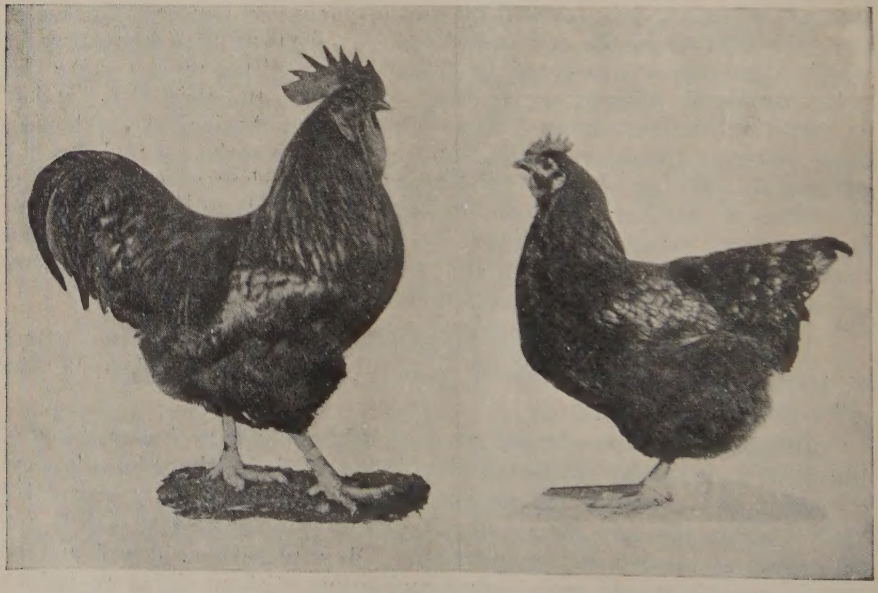


Plate 17.
AUSTRALORPS.

Carriage.—Erect and graceful—that of an active bird: 10 points.

Weight.—Cockerel, 7 lb. to 8 lb.; cock, 8 lb. to 9 lb.; pullet, 5 lb. to 6 lb.; hen, 6 lb. to 7 lb.: 5 points.

Total: 100 points.

Disqualifications.—Side sprigs, any deformity.

Serious Defects.—White in lobes.

The Australorp has been evolved by a process of selection by Australian breeders, from the breed originally known as the Orpington. The Orpington was evolved by Cook, of Kent, Great Britain. Cook states that this breed was made up as follows:—Minorca male mated to a Black Rock female. The female from that mating was mated with Langshan males. The Minorcas used were birds carrying red lobes, and the Langshans were clean-legged.

The Orpington as made by Cook may have been very little different from the Australorp of to-day. It was a breed manufactured for its commercial advantages. Unfortunately, the original Orpington was developed along certain lines by the showman until it reached a stage when it was of no commercial value to the poultry raiser. Those who were interested in the breed from a commercial point of view, however, did not follow the popular craze, but commenced terming the breed "Utility Orpingtons." In the effort to increase the production ability of the breed, birds somewhat longer-bodied and a little closer in feather were selected for breeding purposes. It is considered that these two features are the only outstanding alterations in the make-up of the Australorp as compared with the Orpington as originally made by Cook.

The Australorp is the most popular dual-purpose fowl in Australia, being a particularly good egg-producer, especially during the first year's production, and at the same time carrying table qualities that are appreciated.

Constant selection has given the industry strains of Australorps in which broodiness is most rare, although the breed is classed as a sitting breed. As no standard existed until 1930, there is considerable variation in types as well as in weight. The weights as laid down by the standard give a bird of sufficient size for table purposes, and breeders should avoid exceeding these weights with the same degree of care as they would employ in guarding against undersized birds.

It is a rapid-maturing breed, pullets laying at the age of five months being not uncommon, while cockerels can be marketed at the live weight of 6 lb. at from eighteen to twenty weeks.

The standard for the breed gives a very good idea of what is required. As the Minorca and Langshan were used originally in the make-up of the Orpington, avoid using birds in the breeding pen showing any whiteness in ear-lobes or feathers on legs. Closeness of feather is desired. Therefore, in breeding, females with obvious cushions should be avoided. A common fault among males is the profuse saddle hackle standing out well from the body. Males of this type tend to produce females with excessive cushion.

In many strains of Australorps there is a tendency for the comb of the bird, instead of following the curve of the head, to run in an upward direction. This is very obvious in males and can easily be selected against, but in females it is not so obvious; therefore it is necessary to give this matter closer attention.

CHINESE LANGSHANS.

General Characteristics.

THE COCK.

Head.—Skull small and full over the eyes. Beak fairly long and slightly curved. Eyes large. Comb single, medium size, straight and upright, showing good clearance back of head, free from side sprigs, evenly serrated with five or six spikes of fine texture. Ear-lobes and wattles medium size. Face to be clean.

Neck.—Of medium length, with a full flowing hackle.

Body.—The back fairly broad, flat, of medium length, saddle abundantly furnished with hackles; breast fairly deep and well-rounded from shoulder to shoulder, not flat; breast-bone straight, with keel level. Wings of medium length, closely carried.

Tail.—Of medium size, carried gradually up and outwards to an angle of about 35 degrees, and medium width, fairly close, furnished with plenty of tail coverts and two secondaries and two sickle feathers slightly longer.

Legs.—Thighs medium length covered with short soft feathers. Shanks of medium length, small-boned, standing well apart and feathered down the outer sides (not too heavily or too scantily).

Feet.—Toes: Four, straight, slender, and well-spread, the outer toe being feathered.

Carriage.—Graceful, neat, and extremely active.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Colour.—Beak light to dark-horn, not white. Eyes dark-brown. Face free from feathers. Wattles and ear-lobes to be brilliant red. Legs and feet blue-black, showing pink between the scales; the web and bottom of feet pink-white (the deeper the pink the better); toe-nails white.

Plumage.—Dense black with a brilliant beetle-green gloss free from purple or blue tinge, medium texture, not too tight like the Game, not so loose as the Cochin.

Weight.—Cock, 6½ lb.; cockerel, 5½ lb.; hen, 5½ lb.; pullet, 4½ lb. minimum.

Eyes.—Dark-brown or black.

Serious Defects.—Yellow legs; white beak or yellow eyes; five toes; permanent white in the ear-lobes; slate or blue legs in young birds; white feathers; vulture hocks; wry tail; squirrel tail; lop combs; side sprigs; crooked breast-bone amounting to deformity. Deduct up to 5 points for feathers on middle toes. It might be added that the female shape should be free from lumpy or squat appearance, and that the back should be devoid of cushion or fullness at saddle.

The Langshan undoubtedly originated in China, where it has been bred for centuries. The name is derived from the district of Langshan, in China. Major Croad, after whom a variety is named, first introduced this breed into England in 1872. The first introduction of Langshans into Australia is unknown.

Langshans are good table fowls, and the variety known as Chinese or Australian is noted for its egg-laying qualities. This variety has proved itself by repeatedly laying the highest number of eggs in the heavy breed sections of egg-laying competitions. In this regard it is quite comparable with the Australorp. The breed is not so popular as the Australorp, possibly because of the fact that the birds are smaller.

The Chinese Langshan is a very compact bird, exceptionally alert and active, whilst the feathering is fairly close or tight. The face is usually exceptionally free from feathering and bright red—a good feature that should not be overlooked when selecting breeding birds.

The standard calls for black plumage with beetle-green sheen. As this is not difficult to obtain, birds with purple or bluish sheen should not be used.

Common faults that may be found are light-coloured eyes, feathers on the middle toe, and white feathers. These are features which should be guarded against in the selection of breeding birds.

RHODE ISLAND REDS.

General Characteristics.

THE COCK.

Head.—Skull strong but not thick. Beak curved, moderately long. Eyes large and bright. Comb (*a*) single or (*b*) rose; (*a*) medium size, upright, straight and firmly set, with five even serrations; (*b*) low and firm, oval top covered with small points and terminating in a small spike, following the curve of the head. Face smooth. Ear-lobes fine texture, well developed and pendent. Wattles of medium size and moderately rounded.

Neck.—Of medium length and profusely covered with hackle flowing over the shoulders, but not too loosely feathered.

Body.—Fairly deep, broad and long, but a distinct oblong rather than square; broad and full breast; long back, horizontal except where the neck hackle flows over the shoulders and the saddle gently rises; large wings well folded and the flights horizontal; fairly small tail, sickles passing a little beyond the main feathers, well spread, and carried somewhat low (but by no means drooping) to increase the apparent length of the bird.

Legs.—Of medium length; large thighs; well-rounded shanks free from feathers. Toes (four) straight, strong, and well spread.

Carriage.—Alert, active, and well balanced.

Weight.—8½ lb.; cockerel, 7½ lb.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Weight.—6½ lb.; pullet, 5 lb.

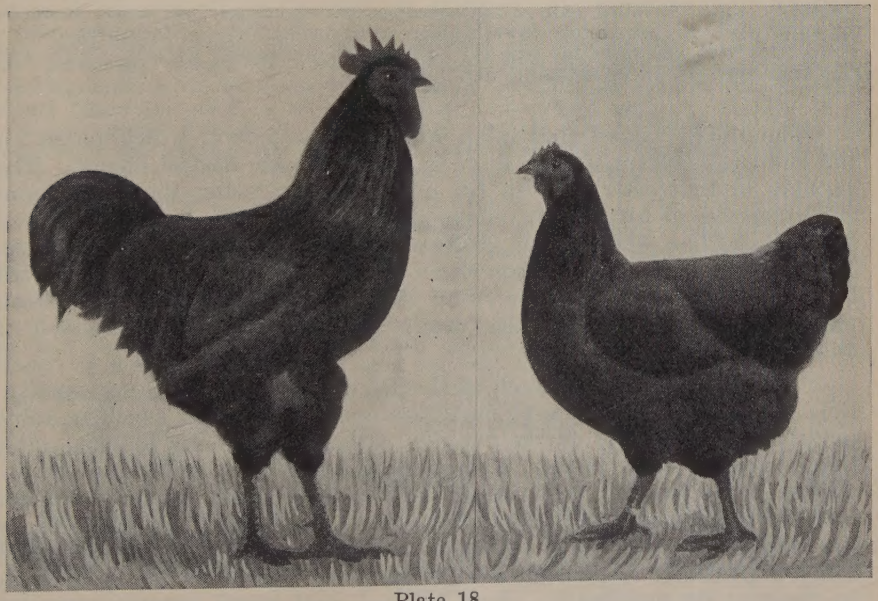


Plate 18.
Rhode Island Reds.

Colour.

Beak red-horn or yellow. Eyes red. Comb, face, ear-lobes, and wattles brilliant red. Legs and feet yellow or red-horn.

Plumage of Cock.—Hackle red, harmonising with the back and breast. Wing primaries, lower web black, upper red; secondaries, lower web red, upper black; flight coverts black; bows and coverts red. Tail (including sickles) black or green-black; coverts mainly black, but may be russet or red as they approach the saddle. Remainder, general surface rich brilliant red, except where black is specified, free from shafting, mealy appearance, or brassy effect; depth of colour (red) is slightly accentuated on wing bows and back, but the least contrast between these parts and the hackle or breast the better, a harmonious blending desirable. The bird should be of so brilliant a lustre as to have a glossed appearance. The under-colour and quills of the feathers should be red or salmon. With the saddle parted showing the under-colour at the base of the tail, the appearance should be red or salmon, not white or smoke. Black or white in the under-colour of any section is undesirable. Other things being equal, the specimen having the richest under-colour shall receive the award.

Plumage of the Hen.—Hackle red, the tips of the lower feathers having a black ticking but not a heavy lacing. Tail black or green-black. Wings as in the cock. Remainder, general surface lighter and more even than in the male, free from shafting or mealy appearance, and except where black is specified a rich even shade of bright red, not as brilliant a lustre as the male. The under-colour and quills of the feathers should be red or salmon. Black or white in the under-colour of any section is undesirable. Other things being equal, the specimen having the richest under-colour shall receive the award.

Scale of Points.

Colour (plumage, &c., 25, eyes 5)	30
Type, including size	30
Quality and texture	15
Head	10
Condition	10
Legs	5
	100

Serious Defects.—Feather or down on shanks or feet, or unmistakable indications of a feather having been plucked from the same; badly lopped combs, side sprig or sprigs on the single comb; entire absence of main tail feathers; two absolutely white (so-called wall or fish) eyes; a feather entirely white that shows in the outer plumage; an ear-lobe showing more than one-half the surface permanently white (this does not mean the pale ear-lobe, but the enamelled white); shanks and feet other than yellow or red-horn; any deformity.

The Rhode Island Red is an American breed which originated on the shores of Narragansett Bay, in the State of Rhode Island. The farmers in that district, with the object of improving the vigour and table qualities of farm flocks, engaged in crossing. The birds introduced for this purpose were Cochin, Brown Leghorn, Malay, and Wyandotte. The result of crossing and selection evidently interested serious-minded breeders in the bird, with the result that in 1901 a standard was drawn up and in 1904 the breed was admitted to the American standard of perfection.

An outstanding character of the Rhode Island Red is its constitution, the bird being of a very hardy nature. It possesses excellent table qualities and matures fairly rapidly, although chickens hatched later than August appear to lag. This may be a matter of individual strain Although the breed is used extensively in some parts of the world for commercial purposes, such is not the case in Queensland. It has been, in the main, a fancier's bird. Colour and size as aimed for on the show bench is probably responsible for the fact that less effort has been made to improve its prolificacy. It is a breed well worth greater attention being given to its production ability by commercial breeders.

In breeding, select standard weight birds. Oversized birds are invariably poor producers, and as there appears a tendency for the breed to revert to the smaller-sized birds of its ancestry, under-sized birds should not be used.

The body of the Rhode Island should approach in shape an oblong rectangle. It should be carried level and the line of the back kept horizontal. The wings should have no tendency to drop but should be carried on a level with the back. The back should be flat from front to rear and also from side to side. It needs to be wide, and the width carried the full length of the body. The breast should be full and prominent to fill in the rectangular shape. A perpendicular line from the breast should meet the base of the beak. The bird should be well balanced, with legs under the centre—shanks fairly stout and of medium length, stiltiness to be avoided.

Colour of eye in females tends to fade with production, and some good-eyed birds as pullets will have pale or greenish eyes as hens. Old birds with good eye colour are most valuable breeders. Select against dark or blackish streaks in beaks, as this fault is troublesome. Do not breed from extremely dark males, as females from this mating will invariably be mottled. Matings should consist of rich snappy coloured males of even shade in hackle, wing-bows, and saddle, and females which are dark rich and even in colour. In addition to depth of colour the plumage should be lustrous bright and alive and not a dead brown or chocolate.

With age white may appear in the back and saddles of males, but if the bird was sound as a cockerel it is not a very serious defect. Very few hens approach closely their pullet colour. Those that do are most desirable breeders.

WYANDOTTES.

General Characteristics.

THE COCK.

Head.—Skull short and broad. Beak stout and well curved. Eyes intelligent and prominent. Comb rose, firmly and evenly set, low, square-fronted, gradually tapering towards the back and terminating in a well-defined spike or leader, which should follow the curve of the neck without any upward tendency; the top of it oval and covered with small and rounded points, the side outline being convex to conform to the shape of the skull. Face smooth and fine. Ear-lobes oblong, well developed, and smooth. Wattles of medium length, fine, and well rounded.

Neck.—Of medium length, well covered with hackle.

Body.—Short and deep, with well-rounded sides; broad round breast with straight keel; short back with full and broad saddle rising with a concave sweep to the tail; wings of medium size, well folded; tail medium size, but full, spread at base, the main feathers carried rather upright, the sickles of medium length.

Legs.—Of medium length. Thighs well covered with soft and webless feathers, the fluff fairly close and silky. Shanks strong, fine, well rounded, and free of feather or fluff. Toes (four) straight and well spread.

Carriage.—Graceful and well balanced, alert and active, but docile.

Plumage.—Fairly close and silky, not too abundant or fluffy.

Weight.—8½ lb.; cockerel, 7 lb.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Weight.—7 lb.; pullet, 5½ lb.

Colour.

Beak bright yellow, except Columbian, yellow, or horn. Eyes bright bay. Comb, face, wattles, and ear-lobes bright red. Legs and feet bright yellow.

Plate 19.
White Wyandottes.

THE COLUMBIAN.

Plumage.—Pearl-white with black markings: primaries (wing), black or black edged with white; secondaries, black inner web and white outer; the cock's neck-hackle broadly striped with black down the centre of each feather, such stripe to be entirely surrounded by a clearly-defined white margin with a decided white point (free from black outer edging or black tips) and his tail glossy green-black, the coverts either laced or not with white; the hens hackle bright intense black, each feather entirely surrounded by a white margin, and tail feathers black, except the top pair, which may or may not be laced with white. Remainder (in both sexes), white, entirely free of ticking, with slate, blue-white, or white under-colour.

THE WHITE.

Plumage.—Pure white, free from yellow or straw tinge.

Scale of Points.

THE COLUMBIAN.

Colour and markings (body 15, hackle 10, tail 5, flights 5, legs 5)	40
Type	25
Head (comb 10, eyes 5)	15
Size 8, condition 7	15
Texture	5
	100

THE WHITE.

Type	25
Colour	25
Size	15
Head	15
Legs	10
Condition	10
	100

Serious Defects.—Any feathers on shanks or toes; permanent white or yellow in ear-lobe, covering more than one-third of its surface; comb other than rose, or falling over one side, or so large as to obstruct the sight; shanks other than yellow (except in adult cocks and hens, which may shade to light straw); any deformity. In Whites other than white feathers; in Columbians, brown under-colour, green eyes, coarseness, inactivity, overhanging eyebrows.

The Wyandotte is an American breed, which is not bred extensively in this State. It is another breed made by a series of crosses. The first cross is believed to have been between the Sebright Bantam and Cochin Hen, and later Silver Spangled Hamburg, Buff Cochin, and Dark Brahma. The breed did not become popular commercially until the White was developed. This was a sport from the Silver breed.

The commercial possibilities of the breed were then visualised, as the breed was hardy, a good forager, docile, and the chickens grew rapidly. The type of the Wyandotte ensures a carcase pleasing to the eye at any stage of development, and as its laying capacity was increased, it soon became popular; in fact, in Great Britain it is as popular as the White Leghorn.

This breed can be termed "the breed of curves." It is well-balanced, with legs set in the centre. From the top of its back to the bottom of its feet the distance should equal that from its breast to end of tail. The body is carried horizontally, and depth of body is to be maintained. The maintenance of size is important, but coarseness has to be avoided. A good breadth of body and back is necessary to retain the meat-carrying characteristics of the carcase.

The principal eye defect is colour. Too many have light or almost green eyes. Age is responsible for some of this trouble, but greater selection for eye colour is desirable. Whiteness or paleness is the principal defect in the lobe.

The back has the appearance of being short, due to the curves and abundant hackle, saddle, and general set of the tail. The back shows a short space above the shoulders which is level and then rises towards the tail, blending smoothly and evenly, making it difficult to see where the back terminates and the tail begins. This is what gives the Wyandotte this short appearance. The back should be broad with well-furnished saddle in the male, and a slight cushion or fullness of back held well up by a well-spread tail in the female. This gives the back line of the female from back to the end of the tail a slightly convex outline without the appearance of a Cochiny cushion. Breadth of back carried out in breadth of body, so that the side line of the fowl viewed from above shows smooth and even without hollow indentations, is to be aimed at. The breast must be full and prominent, not low enough to cover the hock line. The tendency to concave breasts, especially on side, and prominent gullet, is to be avoided.

The wings should not be too long; they should be folded snugly and carried level. Low-carried and slanting wings are more common in males than females. The top of the tail should be about level with the junction of the head and neck. Fairly full fluff is desired, but not so full as to hide the thighs. Do not go to the extreme and make the birds too fluffy.

The Columbian.—The black of the Columbian is often inclined to be faded and not intense, and the strong contrast with the white is lost. This is offset by using breeding birds with dark slate under-colour. Select breeders with a clear white surface, with ½-inch to 1½-inch dark

slate under-colour running to white next to the body. To attain the greatest success, keep away from breeders with pure white under-colour and save as breeeders those showing no black on surface or white sections. It is also necessary to guard against brassiness, as this is a serious defect. It is more apparent in males and may appear on hackle, wing-bow, back, and saddle. In females it is more apparent in the white lacing of the hackle.

PLYMOUTH ROCK.

General Characteristics.

THE COCK.

Head.—Skull strong, but not thick. Beak short and stout. Eyes large and bright. Comb single, medium size, straight, and erect, with well-defined serrations, free from side sprigs. Face smooth. Ear-lobes fine texture, well-developed, and pendent. Wattles to correspond with size of comb, and moderately rounded.

Neck.—Of medium length and profusely covered with feathers flowing over the shoulders.

Body.—Large, deep, and compact; broad and well-rounded breast; broad back, of medium length, with saddle feathers of medium length and abundant; medium-sized wings carried well up, the bows and tips covered by the breast feathers and saddle-hackles.

Tail.—Rather small, rising slightly from the saddle, the sickles of medium length and nicely curved, the coverts being sufficiently abundant to cover the stiff feathers.

Legs.—Wide apart, stout, and strong, thighs 2 to 3 inches long (from hock to body), with shanks of medium length and free of feathers. Toes (four) strong, straight, and well spread.

Carriage.—Upright and smart.

Weight.—10 lb. to 12 lb.; cockerel, 8 lb. to 10 lb.

Plate 20.

Barred Plymouth Rock.—Pullet Line.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Weight.—7 lb. to 8 lb.

Colour.

Beak bright yellow. Eyes clear, rich bay. Comb, face, ear-lobes, and wattles bright red. Legs and feet bright yellow.

THE BARRED.

Plumage.—White, of blue tinge, each feather barred across with black of a beetle-green sheen, the bands moderately narrow and of equal breadth, and the colours sharply defined and not shading into each other. The barring should continue through the shaft of the feather and into the fluff and under-colour, and each feather finish with a black tip. The plumage as a whole should present a blue appearance and be uniform—that is, the hackles, wing-bows, and tail corresponding in colour with the other part of the body.

Scale of Points.

THE BARRED.

Type	20
Colour	20
Barring	20
Legs and feet	10
Condition	10
Size	10
Head	5
Tail	5
	100

Serious Defects.—The slightest fluff or feather on the shanks or feet; shanks other than yellow; white ear-lobes; black, red, or white feathers in the Barred.

The Plymouth Rock originated in America. Several lines of barred Plymouth Rocks were developed and united in 1878 to produce the modern breed. In its make-up the American Dominque, the Black Cochin, the White Brahma, and Minorca appear to have been employed.

The barred Rock was a larger-framed bird and a fair producer, with the result that it became very extensively used for commercial purposes in America and Canada. In Queensland, although individual breeders have competed in egg-laying tests, the Rock has figured largely as a breed for the fancier and/or those engaged in the production of their own requirements of eggs and poultry meat.

There is a tendency in both sexes for size to deteriorate, and in breeding birds of standard weight or a trifle over should be selected. Extremes in size, however, should not be aimed for, as this will tend to depreciate the general utility characteristics of the breed. Light or greenish eyes should be avoided. White in lobe is a trouble with which breeders have to contend, although the whiteness which develops with age is not as serious as that in young stock. Split or slipped wings is a trouble fairly prevalent and to be selected against. Another wing trouble that must be avoided is twisted wing flights, which it is claimed suggest constitutional weakness.

Dark spots or green-shaded legs are frequently noted in females. This trouble is difficult to keep out, and constant attention is necessary. Dark shading will also be found in the beak of the female. It is not a serious defect—although yellow is preferable. Long shanks are associated with knock-knees and crooked toes. In addition to the defects already referred to, excessively slow-feathering birds should be avoided in breeding Rocks. These are more prevalent among males than female chickens.

Barred Rocks are bred exclusively by double mating, and cockerel-bred lines and pullet-bred lines are now definitely fixed. The crossing of cockerel and pullet lines would be disastrous from a standard point of view, and it is necessary, therefore, to carry on with the system.

It is as well to point out that black feathers appear among the plumage of the barred Rock. This does not indicate impurity of breed, nor are black feathers a serious defect unless numerous.

Cockerel Mating.—The male to be used should be standard. In colour the female needs to be clean black and white, with no sign of smut. The black bar should be two or three times as wide as the white. Surface colour even in all sections, with under-barring well defined. Some females will have black feathers and even some black wing flights. This denotes plenty of pigment and will assure strong barring in progeny. The colour of the legs and beak is usually darker than exhibition females.

Pullet Mating.—With this mating, we look for the female progeny to have a barring of equal width, the black as black as possible without sheen and the white as white as possible. In this mating use males with white barring two to three times as wide as the black, and females of standard colour.

SUSSEX.

General Characteristics.

THE COCK.

Head.—Skull of medium size. Beak short, strong, and well curved. Eyes full and bright. Comb single, of medium size, upright, evenly serrated, and fitting closely. Face smooth. Ear-lobes and wattles of medium size.

Neck.—Of medium length, with fairly full hackle.

Body.—Broad, deep, and long; square breast and carried well forward with long and deep breast-bone; wide shoulders; broad and flat back; wings carried closely; tail of moderate size, carried at an angle of 45 degrees.

Legs.—Short and rather wide apart, the thighs stout and the shanks strong and free from feathers. Toes (four) straight and well spread.

Carriage.—Graceful, showing length of back, vigorous and well balanced.

Plumage.—Close and free from any unnecessary fluff.

Weight.—9 lb.

THE HEN.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Weight.—7 lb.

Colour.

Beak white or horn. Eyes, comb, face, wattles, and ear-lobes red. Legs and feet white. Flesh and skin white.

THE LIGHT.

Plumage.—Pure white, with black-striped neck-hackle, black in flights, and black tail, the black centre of each feather of the neck-hackle to be entirely surrounded by a white margin.

Scale of Points.

Type	25
Size	20
Colour	20
Legs and feet	15
Head	10
Condition	10
	100

Serious Defects.—Rose comb; feather on shanks; other than four toes; any deformity.

The Sussex was developed in the South of England, but the breeds of fowls used are not definitely known, although it is generally believed that the Silver Grey Dorking entered extensively into its make-up.

The Sussex was developed primarily for its table qualities. Its white flesh, legs, and feet appeal to consumers. This fact, combined with the tenderness and juiciness of flesh and smallness of bone, enhances its table value. Although regarded as a table fowl, the Light Sussex is a fair layer, but the quality of flesh should not be sacrificed by efforts to increase the egg production.

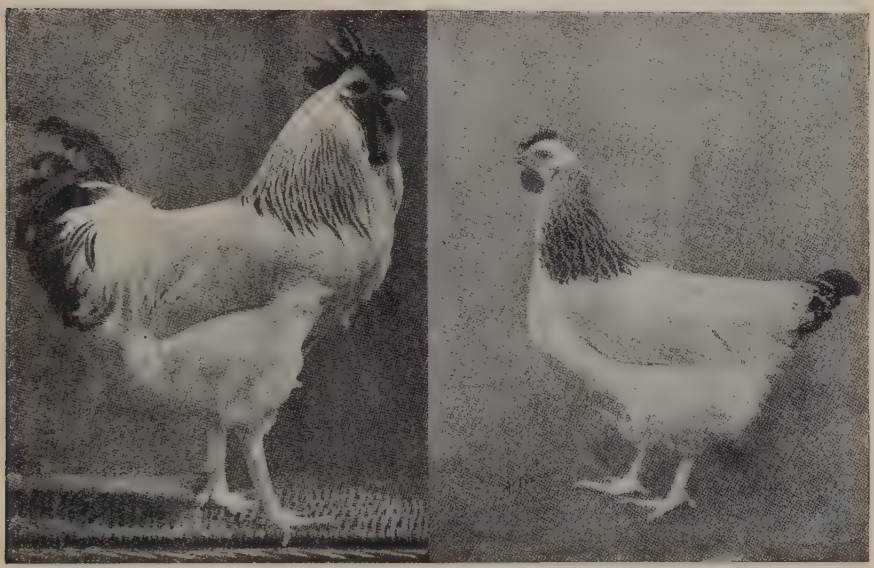


Plate 21.
Light Sussex.

A characteristic of the breed is that the rectangular body is reasonably long, deep, and wide. The breast-bone is reasonably long and well-fleshed. The head is somewhat coarse when compared with other utility breeds, but this can be overcome by selection.

The Light.—As indicated, the back is fairly long. This must not be overlooked, as there is a tendency for the back to be too short. Cut-away or flat breasts are very common, and this is a serious fault. Avoid any sloping or rounding of the back.

The Sussex, being descended from the Dorking, occasionally has five toes; this is definitely a disqualification on the show bench, and also as a breeeder.

Plumage colour is clearly outlined in the standard. The principal faults are brassiness in males and dark or slaty under-colour. These are difficult to breed out.

DUCKS.

THE MUSCOVY.

General Characteristics.

Head.—Large, adorned with small crest of feathers (more pronounced in the male than the female), which are raised erect in excitement or alarm.

Carunculations (fleshy protruberances).—On face and over the base of the bill.

Bill.—Wide and strong, of medium length and slightly curved.

Eyes.—Large, with wild or fierce expression.

Neck.—Of medium length, almost erect, and strongly built.

Body.—Broad, deep, powerfully built, and very long, with full and well-rounded breast carried low down; keel long, well-fleshed, just clear of ground and slightly rounded from stern to stem.

Wings.—Very strong and long, and carried high.

Tail.—Long and carried low to give the body a longer appearance to the eye, and a slightly curved outline to the top of the body.

[*Block by courtesy "Red Comb Bulletin."*

Plate 22.

A TYPICAL MUSCOVY DRAKE.

Legs.—Strong, wide apart, and fairly short, feet straight and webbed, with pronounced toenails; thighs short, strong, and well-fleshed.

Carriage.—Low and jaunty.

Condition.—Hard, well-fleshed, and muscular; plumage close.

Weight.—Drake, 10 lb. to 14 lb.; duck, 5 lb. to 7 lb. It is a characteristic of the breed for the male to be about twice the size of the female.

Colours of Varieties.

White-Winged Black.—Dense black throughout, except for white wing bows, the black to carry a metallic green sheen or lustre, with bronze on the breast and parts of the neck.

White-Winged Blue.—Blue, except for white wing-bows.

Black.—Dense beetle-green black throughout, with bronze on the breast and parts of the neck.

White.—Pure white throughout.

Blue.—Light or dark shade permissible.

Black and White.—Black and white, with defined regularity of markings.

Blue and White.—Blue and white, with defined regularity of markings.

Variations in Colour.

There are colour variations according to the countries of importation. Eye colour may vary from yellow and brown to blue; leg colour from yellow and mottled to black; bill colour from yellow to black, red or flesh colour or a lighter shade at the point. In the black and white, also the blue and white, it is customary in some countries for the black or blue to predominate in winning specimens at the shows. The face and carunculations can be red or black. For these reasons type and characteristics are, for the time being, to be considered of major importance in judging.

Scale of Points.

Shape and carriage	40
Head points (including crest and carunculations)	20
Size	20
Condition	10
Colour	10
	100

The Muscovy breed originated in South America. They are very hardy, make rapid growth, and are bred extensively for table purposes. Muscovies are indifferent layers.

The body is somewhat rectangular in shape, being slightly arched on the top. The abdomen of the laying duck sags. The carriage is nearly horizontal. The legs are short and very thick. They are very slow at walking, the drake being particularly clumsy. The drake has no curled feathers in the tail.

KHAKI CAMPBELL.

General Characteristics.

Head.—Refined in jaw and skull, with smooth and full face. Bill proportionate, of medium length, depth, and width, well set in a straight line with top of skull. Eyes full, bold, and bright, showing alertness and expression, high in skull and prominent.

Neck.—Of medium length, slender, and refined, almost erect.

Body.—Deep, wide, and compact, appearing slightly compressed, retaining depth throughout, especially from shoulders to chest and from middle of back through to thighs; broad and well-rounded front; wide back, flat and of medium length, gently sloping with shoulders higher than saddle; abdomen well developed at rear of legs, but not sagging; well-rounded underline of breast and stern; closely carried and rather high wings; short and small tail, rising slightly, the drakes with the usual curled feathers.

Legs.—Of medium length and well apart to allow of good abdominal development; not too far back; feet straight and webbed.

Carriage.—Alert, slightly upright and symmetrical, the head carried high, with shoulders higher than the saddle, and back showing gentle slant from shoulder to saddle, the whole carriage not too erect, but not as low as to cause waddling—activity and foraging power should be retained without loss of depth and width of body generally.

Quality or Refinement.—While aiming at good body size emphasis should be placed upon quality or refinement in general., i.e., neat bone, sleek silky plumage, smooth face, fine head points, &c., with absence of coarseness and sluggishness.

Plumage.—Tight and silky, giving sleek appearance.

Weight.—4½ lb. for birds in laying condition in their prime.

[*Original by Wippell from "Poultry Breeding" by Brown.*

Plate 23.

Khaki Campbell Drake.

Colour.

THE DRAKE.

Bill green, the darker the better. Legs and feet dark orange.

Plumage.—Head, neck, stern, and wing-bar bronze, a brown shade preferred to green-bronze. Remainder an even shade of warm khaki.

THE DUCK.

Bill greenish black. Legs and feet as near the body colour as possible.

Plumage.—Khaki all over, ground colour as even as possible, back and wings laced with lighter shade; lighter feathers in wing-bar allowable, but head plain khaki, streak from eyes considered a fault.

Scale of Points.

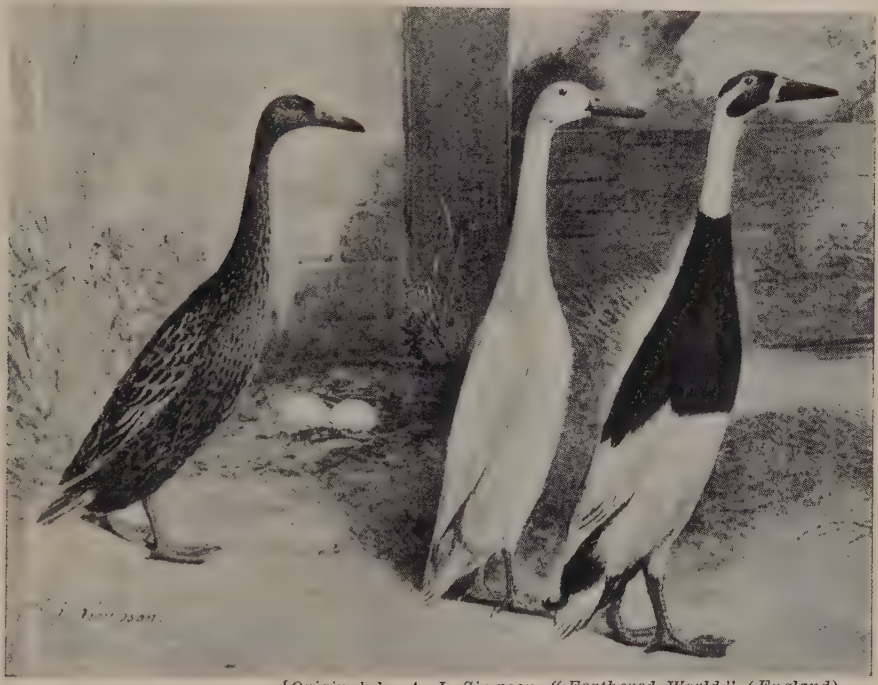
Type (shape and carriage)	25
Colour	25
Quality or refinement	15
Head points	10
Size and symmetry	10
Condition	10
Legs and feet	5
	100

Serious Defects.—Yellow bill; white bib; any deformity; green eggs.

The Khaki-Campbell breed was evolved by crossing Rouen, Indian Runner, and Mallard ducks. It is bred mainly for egg production. It is a very highly strung and nervous breed and must be handled most carefully.

The laying of white-shelled eggs is a very strong feature, therefore special attention must be given to breeding by discarding all greenish-tinted-shelled eggs from incubators.

There is a tendency for this duck to lose size, therefore, in breeding, undersized birds should be avoided.



[*Original by A. J. Simpson, "Feathered World" (England).*

Plate 24.

Indian Runner Ducks.—The Fawn, the White, and the Fawn and White.

THE INDIAN RUNNER.

General Characteristics.

Head.—Lean and racy looking and, with the bill, wedge-shaped. Skull flat on top, and the eye-socket set so high that its upper margin seems almost to project above the line of the skull. Eyes full, bright, very alert, and intelligent. Bill strong and deep at the base where it fits imperceptibly into the skull, the upper mandible very strong and nicely ridged from side to side, and the line of the lower mandible straight also. There should be no depression or hollow in the upper line from its tip to its base; and the outline should run with a clean sweep from the tip of the bill to the back of the skull. The length and depth varies, but should never be out of balance or harmony with the rest of the head and the lines of the bird as a whole.

Neck.—Fine, long, and graceful, and when the bird is on the move or standing at attention, almost in a line with the body, the head being high and slightly forward. The thinnest part is approximately where, in Fawn drakes, the dark bronze of the head and upper neck joins the lower or fawn of the neck proper; the muscular part should be well marked, rounded, and stand out from the windpipe and gullet, the extreme hardness of feather helping to accentuate this. The neck should be neatly fitted to the head.

Body.—Slim, elongated, and rounded, but slightly flattened across the shoulders. At the lower extremity the front line sweeps gradually round to the tail, which is neat and compact and almost in a line with the body or horizontally, but in some excellent birds slightly elevated or tilted upwards—the position of the tail varying with the attitude of the duck, but habitually upturned sterns and tails (as in the Pekin duck) considered objectionable. Stern short compared with other breeds, the prominence of the abdomen and stern varying in ducks according to the season and the age of the bird, being fuller when in lay; but a large pendulous abdomen and long stern or a "cut away" abdomen and stern in young ducks to be avoided. Wings small in proportion to the size of the bird, tightly packed to the body and well tucked up, the tips of the long flights of the opposite wings crossing each other over the rump, more particularly when standing at attention. At the upper extremity the body gradually and imperceptibly contracts to form a funnel-shaped process, which again, without obvious junction, merges into the neck proper, the lower or thickest portion of this funnel-shaped process or "neck expansion" being reckoned as part of the body.

Legs.—Set far back to allow of upright carriage. Thighs strong and muscular, longer than in most breeds. Shanks short and feet supple and webbed. There should be sufficient width between the legs to allow of free egg production, but not as much as to cause the duck, on actual test, to roll or waddle when in motion.

Length.—Total length of drake 26 inches to 32 inches and duck 24 inches to 28 inches. Length of neck proper, from top of skull to where it joins the thick part of the "funnel," about one-third the total length of the bird, not less. Measurements should be taken with the bird fully extended in a straight line, the bill and head in a line with the neck and body, and the legs and feet in the same straight line, the measurements being from the tip of the bill to the tip of the middle toe.

Plumage.—Tight and hard.

Carriage.—Upright and active. The "angle of inclination" of the body to the horizontal varies from 50 degrees to 70 degrees when on the move and not alarmed; but when standing at attention, or excited, or specially trained for the show-pen, it may assume an almost perpendicular pose.

Weight.—Drake, 4 lb. to 5½ lb.; duck, 3½ lb. to 5 lb. Birds bred and shown in the same year as hatched may be accepted for competition at ½ lb. less.

THE FAWN DRAKE.

Bill pure black to olive-green, mottled with black, and black bean. Legs and feet black or dark tan, mottled with black.

Plumage.—Head and upper part of the neck dark bronze with metallic sheen, which may show a faint green tinge, meeting the colour of the lower part of neck with a clean cut or the lower colour merging into it imperceptibly. Lower neck and "neck expansion" rich brown-red continued on to the breast, over the shoulders, and upwards to where it joins the head and upper neck colour, merging gradually on the back and breast into the body colour. Lower chest, flanks, and abdomen french-grey, made up of very minute and dense peppering of dark brown, or almost black, dots on a nearly white ground, giving a general grey effect without any show of white, the grey extending beyond the vent until it meets the dark or almost black feathers of the cushion under the tail. Scapulars (the long-pointed feathers on each side of the back covering the roots of the wings) red-brown, peppered. Back and rump deep brown, almost black. Tail (fan feathers and curl) dark brown, almost black. Wings, bow fawn, not pencilled; bar fawn, corresponding with the coverts in the lower part, the upper part darker brown, corresponding with the secondaries, which are black-brown with slight metallic lustre; primaries, brown, fairly dark. (*Note.*—When the drake is in "eclipse" or duck plumage he more closely approaches the duck in colour. All the dominant colours fade, but his head and neck are darker than the duck's; the body becomes a dirty fawn or ash, with perhaps some rustiness on the breast.)

THE FAWN DUCK.

Bill black. Eye iris golden-brown. Legs and feet black or dark tan.

Plumage.—The general colour an almost uniform ginger-fawn, with no marked variation of shade, and a slightly mottled or speckled appearance. When closely examined the head, neck, lower part of chest, and abdomen may appear a shade lighter than the rest of the body. Each feather of the head and neck has a fine line of dark red-brown, giving a ticked appearance. Lower part of neck and "neck expansion" a shade warmer, each feather pencilled with a warm red-brown.

Scapulars rich ginger-fawn, a shade darker than the shoulder and back, with well-marked red-brown pencilling. Wing, bow a shade lighter than the scapulars but darkening towards the bar, the feathers pencilled as before; secondaries, warm red-brown; primaries, a shade lighter. Back and rump darker, the pencilling being richer and more marked, but the ground colour becomes lighter and warmer towards the tail. Tail lighter, each feather pencilled. Belly lighter than upper parts of body, about the same shade of fawn as the head and neck, becoming a trifle darker on the tail-cushion, all feathers pencilled.

THE FAWN AND WHITE.

Bill light orange-yellow in young birds; entirely, or almost entirely, dull cucumber in adult duck, and green-yellow in the adult drake. Legs and feet orange-red.

Plumage.—Cap and cheek markings in the duck nearly the same shade of fawn as the body colour, but dull bronze-green in the drake. The cap separated from the cheek markings by a projection from the white of the neck extending up to, and in most cases terminating in a narrow line more or less encircling, the eye. The cap should come round the back of the skull with a clean sweep—there should be no "tails" to it. The cheek markings should not extend on to the neck. Bill divided from head markings by a narrow prolongation of the neck-white, from ⅛ inch to ¼ inch wide, extending or projecting from the white underneath the chin. Neck pure white to about where the "neck-expansion" begins and meeting the body with a clean cut. Body uniform soft warm or ginger-fawn to the skin. The rump and tail of the drake, including the under surface of his tail, a similar hue to his head. When closely examined the coloured body-feathers of the drake show a soft warm ground slightly peppered with a rather warmer shade—that is, the colour seems solid and more ruddy than that of the duck. The duck should have the same shade of fawn as the Fawn duck. The fawn and the white should meet on the breast with an even cut about half-way between the point of the breast-bone and the legs. The base of the neck, upper part of wings, back, and tail should be as nearly as possible the same colour as the fawn of the breast, and from the fawn of the back an irregular branch on either side extending downwards on the thighs to, or nearly to, the hough. The white of the breast extends downwards between the legs to beyond the vent and may overlap the thighs in part. Wings, primaries, secondaries, and lower part of bow pure white, which gives the appearance of a "heart" laid flat on the bird's back.

THE WHITE.

Bill, legs, and feet orange-yellow. Eye iris light-blue or grey-blue.
Plumage.—Pure white throughout.

Scale of Points.

Body (shape and general appearance of, including the lower part of neck, legs, and feet)	45
Carriage and action	20
Head, eyes, bill and neck (exclusive of lower neck expansion)	20
Colour and condition	15
	100

Serious Defects.—Above and below standard weights and measurements; body squat and short, oval or flattened; domed skull with central position of eyes; bill dished, weak, "Roman," under-curved, or flat; neck thick and short, swan, or curved; neck-expansion too far back on body, causing a chesty appearance in front with a hollow behind; legs set too far forward, causing poor carriage; waddling or rolling gait; a natural carriage in any duck below 40 deg.; long stern; wry tail; flattened back; slipped wing or any deformity. In Fawns, white anywhere; eyebrows or eye-stripes; light or cream wings (bows, coverts, and flights), in the duck; blue or green wing-bars; orange or yellow bill, feet or legs.

It is generally believed, as the name implies, that the Indian Runner duck originated in India.

It is the smallest of all domestic ducks, and there is a general tendency for the breed to decrease in size; this indicates the necessity of using as breeders birds which conform to the standard weights. Primarily this breed is kept for its prolific laying qualities, and to maintain these features any indication of coarseness must be avoided.

GEESE.

THE TOULOUSE.

General Characteristics.

Head.—Strong and massive. Bill strong, fairly short, and well set in a uniform sweep, or nearly so, from the point of the bill to the back of the skull. Eyes full.

Neck.—Long and thick, the throat well gulleted.

Body.—Long, broad and deep; prominent breast, deep and full, the keel straight from stem to paunch, increasing in width to the stern and forming a straight underline; broad shoulders; back slightly curved from the neck to the tail; large and strong wings; somewhat short tail carried high and well spread; paunch and stern heavy and wide, with a full rising sweep to the tail.

Legs.—Short; shanks stout and strong-boned; straight toes connected by web.

Carriage.—Somewhat horizontal, not as upright in front as the Embden, and thick set.

Plumage.—Full, somewhat soft.

Weight.—Gander, 28 lb. to 30 lb.; goose, 20 lb. to 22 lb.

Colour.

Bill, legs, and feet orange. Eyes dark-brown or hazel.

Plumage.—Neck dark-grey. Breast and keel rather light-grey, shading dark to thighs. Back, wings, and thighs dark steel-grey, each feather laced with an almost white edging, the flights without white. Stern, paunch, and tail white, the tail with a broad band of grey across the centre.

Scale of Points.

Type (head and throat, 15, breast and keel, 10, tail, stern, and paunch 10, neck 5, general carriage 15)	55
Size	20
Colour and markings	10
Condition	10
Legs and feet	5
	100

Serious Defects.—Patches of black or white among the grey plumage; slipped or cut wings; any deformity.

THE EMBDEN.

General Characteristics.

Head.—Long and straight. Bill fairly short, stout at base. Eyes bold.

Neck.—Long and swan-like, the throat uniform with the under mandible and neck—i.e., without a gullet.

Body.—Broad, thick and well rounded; round breast, with very little, if any, indication of keel; broad shoulders and stern; long straight back and deep paunch; large and strong wings; close tail, carried well out.

Legs.—Fairly short; large and strong shanks; straight toes connected by web.

Carriage.—Upright and defiant.

Plumage.—Hard and tight.

Weight.—Gander, 30 lb. to 34 lb.; goose, 20 lb. to 22 lb.

Colour.

Bill orange. Eyes light-blue. Legs and feet bright orange.

Plumage.—Pure glossy white.

Scale of Points.

Type (breast 20, head 12, general carriage 12, neck 10)	54
Size	20
Colour	10
Condition	10
Legs and feet	6
	100

Serious Defects.—Plumage other than white; any deformity.

The Toulouse.—This breed originated in France. It is grey in colour, with the exception of the lower portion of the body, which is white. The bill is pale-yellow and the legs and feet reddish-orange. The bird is large in frame and loosely feathered, giving it a massive appearance.

The Embden.—This is a white goose with bright blue eyes; bill and legs of orange colour. It is a large and compact goose. The females are excellent layers and good mothers. The young goslings are very hardy and make rapid growth.

The farm, with facilities for free range and an abundance of green feed, is the natural habitat of the goose. Although the keeping of geese on a large scale is not recommended, a small flock upon the farm will be found economical and profitable to keep.

[*By courtesy of "Poultry Tribune," Mount Morris, Ill., U.S.A., and reproduced from "Poultry Breeding" by Brown.*

Plate 25.

Bronze American Turkeys.

TURKEYS.

General Characteristics.

Head.—Long, broad, and carunculated (covered with fleshy protuberances). Beak strong, curved, and well set. Eyes bright and bold. Throat wattle large.

Neck.—Long and curved back when strutting, the top and most of the front carunculated.

Body.—Long, deep through the centre, and well rounded; broad and full breast, the cock's beard long, bristling and prominent; back somewhat curving, rising from the neck to the centre and descending in a graceful slope to the tail; large and powerful wings carried well up and closely to the side; long and drooping tail, the end almost touching the ground.

Legs.—Fairly long. Shanks large and strong. Toes (four) straight and powerful, well spread.

Carriage.—Stately and upright.

Plumage.—Hard and glossy, with short fluff.

Weight.—Bronze: cock, 30 lb. to 50 lb.; cockerel, 25 lb. to 35 lb.; hen, 18 lb. to 26 lb.; pullet, 14 lb. to 22 lb. Other breeds: cock, 25 lb. to 40 lb.; cockerel, 18 lb. to 25 lb.; hen, 14 lb. to 20 lb.; pullet, 12 lb. to 18 lb.

Colour.

THE BLACK.

Beak dark horn or slate-black. Eyes dark hazel. Head (including face, jaws, throat wattle, and caruncles) brilliant red, changeable to blue-white. Legs and feet dark lead or slate black.

Plumage.—Lustrous black.

THE BRONZE.

Beak horn. Eyes, dark-hazel iris and blue-black pupil. Head as in the black. Legs and feet black or horn.

Plumage.—Body rich metallic bronze throughout; black flights, with a definite white barring; black and brown tail, with a broad black band edged with white.

THE BUFF.

Beak horn. Legs and feet flesh-coloured.

Plumage.—Deep cinnamon brown, except flights and secondary feathers (in wings), which are white and thigh-fluff buff.

THE WHITE.

Beak pink or flesh. Eyes and head as in the Bronze. Legs and feet pink (flesh colour).

Plumage.—Pure white; the cock's beard a deep black.

Scale of Points.

Type	25
Weight	25
Colour	20
Head, neck, and wattle	15
Legs and feet	10
Condition	5
	100

Serious Defects.—Wry tail; crooked breastbone; any other deformity. In the Buff, white in tail.

All races of domesticated turkeys are undoubtedly descendants of the wild turkey of North America. They are more or less game, and thrive well when they have access to open grassed country.

The raising of turkeys can be made a profitable undertaking where they have range and can gather some of their own food requirements in the form of grass seeds, &c. In many countries turkey-raising is engaged in upon an extensive scale and conducted more or less upon the lines employed in the raising of fowls. The turkey appears to do better in the dry inland districts than on the coast.

Varieties.

The Bronze.—This is the most popular, probably due to its size and hardiness and ranging habits. This habit, however, increases the difficulty of breeding under the confined conditions that have to be used in districts where the fox is troublesome.

The White.—It is claimed by some that the White is the most domestic and the most prolific—a factor of importance in reducing costs of production.

[TO BE CONTINUED.]

Control Schedules for Citrus Pests and Diseases in South-Eastern Queensland.

N. E. H. CALDWELL, M.Sc.Agr., Assistant Research Officer, and F. W. BLACKFORD, M.Sc.Agr., Assistant Research Officer.

IN recent years considerable progress has been made in the study of citrus pests and diseases in Queensland, and it is now possible to make fairly precise recommendations for the control of the majority of these as they occur in the south-eastern portion of the State. These recommendations are here presented in tabulated form as schedules which should enable the orchardist to obtain the required information practically at a glance. He is thus relieved of the necessity for searching through numerous advisory publications for the precise information required.

At the same time, the schedules are not intended to supersede the more comprehensive advisory publications, but are to be used in conjunction with them. A certain degree of flexibility has been admitted in the schedules, particularly with respect to pest and disease complexes and to timing spray applications. These allow for differences between orchards and for variations in seasonal conditions. Thus orchardists must still be able to recognise and assess the importance of the pests and diseases dealt with, and must still use their own judgment to some extent if they are to make the best use of the schedules.

Some citrus growers have been controlling their pests and diseases by programmes differing to a greater or lesser extent from these recommendations. It is not suggested that such orchardists should necessarily abandon their existing practices, but they are strongly advised to examine critically their control operations to see if they are obtaining the best results for their expenditure in this direction.

Two schedules are provided, one for inland areas such as Gayndah and Roma, the other for coastal areas such as Nambour and Burrum. Growers in intermediate districts may use either, provided they realise that as one nears the coast conditions usually become less favourable for fumigation. The schedules are designed primarily for bearing trees—young trees can be treated with considerably more latitude.

In using this table, the grower should attempt to become familiar with the exact pest and disease position in his orchard. He decides which pest or disease is his major concern, and looks for it in the second column of the table in the appropriate yearly period. He then selects the combination of this pest or disease with others listed in column three that most nearly corresponds to the association occurring in his orchard. The treatment for this particular combination is the one that should be used.

Pest and disease control methods used in the orchard are discussed in more detail in other publications issued by the Department of Agriculture and Stock.

SCHEDULE A.—FOR COASTAL AREAS IN SOUTH-EASTERN QUEENSLAND.

Period.	Dominant Pest or Disease.	Other Pests and Diseases Controlled by Prescribed Treatment.	Treatment.	Varieties.	Time of Application.	Remarks.
LATE WINTER	Maori mite ..	White louse	Lime sulphur (1–15) ..	All	Pre-blossom	This spray also controls lichenous growth and checks bud mite
	White louse	Maori mite	,, ...	,, ...	,,	
SPRING ..	Black spot ..	Melanose, brown spot, scab	Cuprous oxide mixture (3–40)	All	½ to ¾ petal fall	Zinc sulphate-lime (4 lb.–2 lb.–40 gal.) for zinc-cured mottle leaf, lead arsenate for grasshoppers, and nicotine sulphate for aphids, may be added to this spray
	Melanose ..	Black spot, brown spot, scab	,, ...	,, ...	,,	
	Brown spot ..	Black spot, melanose, scab	,, ...	Emperor of Canton mandarin	,,	
	Scab	Black spot, melanose, brown spot	,, ...	Lemons and mandarins	,,	
EARLY SUMMER	Black spot ..	(*a*) Brown spot	Cuprous oxide mixture (3–40)	All	Approximately 8 weeks after spring application of cuprous oxide mixture	
		(*b*) Pink wax scale, white wax scale, brown spot	Cuprous oxide mixture (honey formula, 3–40) combined with soap-washing soda, soap-washing soda-oil or resin-caustic soda-fish oil	,, ...	Late November to early December	Timing of this spray is determined by scale development, which might necessitate delay until mid-December. Later application would give less efficient disease control
	Brown spot ..	(*a*) Black spot	As for black spot (*a*) ..	Emperor of Canton mandarin	As for black spot (*a*)	
		(*b*) Pink wax scale, white wax scale, black spot	As for black spot (*b*) ..	,, ...	As for black spot (*b*)	
	Pink wax scale	(*a*) White wax scale ..	Soap-washing soda ..	All	Late November to early December	
		(*b*) Black spot, brown spot, white wax scale	As for black spot (*b*) ..	,, ...	,, ...	Brown spot occurs only on the Emperor of Canton mandarin
	White wax scale	(*a*) Pink wax scale	As for pink wax (*a*) ..	,, ...	,,	
		(*b*) Black spot, brown spot, pink wax scale	As for black spot (*b*) ..	,, ...		
MID-SUMMER ..	Maori mite ..	..	Lime sulphur (1–35) or sulphur-lime dust (1–1)	All	Mid-December to mid-January (at least 1 week after early summer spray of cuprous oxide mixture has been used)	Care must be taken to avoid very hot January weather, especially if trees are suffering from drought. The dust is preferable in hot weather

Late Summer to Autumn	Brown spot ..	(*a*)	Cuprous oxide mixture (3–40)	Emperor of Canton mandarin	Late February	
		(*b*) Red scale	Cuprous oxide mixture (honey formula, 3–40) with oil	,, ...	Late February to early March	Timing of this spray is determined by scale development, which might necessitate delay until mid-March. Later application would give less efficient disease control
		(*c*) Pink wax scale	Cuprous oxide mixture (honey formula, 3–40) with soap-washing soda mixture	,, ...	,,	
		(*d*) Red scale, pink wax scale, white wax scale, mussel scale	Cuprous oxide mixture (honey formula, 3–40) with soap-washing soda-oil or resin-caustic soda-fish oil	,, ...		
	Red scale ..	(*a*)	Fumigation or oil	Early	Mid-February to early March	In the Maroochy district, weather conditions make fumigation impracticable
				Mid-season and late	March to April	
		(*b*) Pink wax scale, mussel scale	Fumigation, soap-washing soda-oil or resin-caustic soda-fish oil	Early	Mid-February to early March	
				Mid-season and late	March to April	
		(*c*) Brown spot	As for brown spot (*b*) ..	Emperor of Canton mandarin	Late February to early March	
	Pink wax scale	(*a*) White wax scale ..	Soap-washing soda ..	All	Late March to April	
		(*b*) Red scale, mussel scale	Fumigation, soap-washing soda-oil or resin-caustic soda-fish oil	,, ...	,,	
		(*c*) Brown spot	As for brown spot (*c*) ..	Emperor of Canton mandarin	Late February to early March	
	White wax scale	Pink wax scale, mussel scale	Soap-washing soda-oil or resin-caustic soda-fish oil	All	Late March to April	
	Mussel scale	(*a*) Red scale, pink wax scale, white wax scale	Fumigation, soap-washing soda-oil or resin-caustic soda-fish oil	,, ...	,,	
		(*b*) Brown spot, red scale, pink wax scale, white wax scale	As for brown spot (*d*) ..	Emperor of Canton mandarin	Late February to early March	
	Bronze orange bug	Red scale, pink wax scale, white wax scale, mussel scale	Resin-caustic soda-fish oil ..	All	Late March to April	

SCHEDULE B.—FOR INLAND AREAS IN SOUTH-EASTERN QUEENSLAND.

Period.	Dominant Pest or Disease.	Other Pests and Diseases Controlled by Prescribed Treatment.	Treatment.	Varieties.	Time of Application.	Remarks.
LATE WINTER	Maori mite ..	White louse	Lime sulphur (1–15) ..	All	Pre-blossom	This spray also controls lichenous growth and checks bud mite
	White louse	Maori mite	„	„	„	
SPRING ..	Black spot ..	Melanose, scab	Cuprous oxide mixture (3–40)	All	½ to ¾ petal fall	Zinc sulphate-caustic soda (4lb.–1 lb. 2 oz.–40 gal.) for zinc-cured mottle leaf, lead arsenate for grasshoppers and nicotine sulphate for aphids may be added to this spray.
	Melanose ..	Black spot, scab	„	„	„	
	Scab	Black spot, melanose ..	„	Lemons, mandarins	„	
EARLY SUMMER	Larger horned citrus bug	..	Fumigation	Lemons	Late November ..	Treatment is not necessary if egg parasites are active. Fumigation after the previous cuprous oxide spray is considered safe provided at least 6 inches of rain have fallen. When anticipated low rainfall would prevent fumigation following a spray at a 3–40 strength, a 3–80 strength might be substituted as fumigation may follow such an application after 2 to 3 inches of rain.
	Black spot ..	..	Cuprous oxide mixture (3–40)	Lemons	One week after above fumigation	
				Other varieties .	Approximately 8 weeks after spring application of cuprous oxide mixture	
MID-SUMMER	Maori mite ..	..	Lime sulphur (1–35) or sulphur-lime dust (1–1)	All	Mid-December to mid-January (at least 1 week after early summer spray of cuprous oxide mixture has been used)	This treatment is seldom required when fumigation is planned for late January
	Larger horned citrus bug	Red scale, mussel scale ..	Fumigation	„	Late January	*See* remarks re fumigation following cuprous oxide mixture in connection with early summer fumigation
LATE SUMMER TO AUTUMN	Red scale .	(*a*)	Fumigation or oil ..	Early	Mid-February to early March	
				Mid-season and late	March to April	
		(*b*) Mussel scale	Fumigation, soap-washing soda-oil, or resin-caustic soda-fish oil	Early	Mid-February to early March	Late summer to autumn treatment for scale will rarely be necessary if trees are fumigated for larger horned citrus bug in late January
				Mid-season and late	March to April	
	Mussel scale	Red scale	Fumigation, soap-washing soda-oil, or resin-caustic soda-fish oil	All	March to April	

Milk for Cheese Manufacture.

MALCOLM McINTYRE (Chairman Mount Tyson Cheese Factory), E. B. RICE, and L. E. NICHOLS (Dairy Branch).

DAIRY buildings, appointments, and facilities of a reasonable standard are conducive to comfort and greater efficiency in the twice-daily milking routine on a dairy farm, but the limiting factor in the improvement of quality is often the personal equation, which includes the dairy worker's understanding of what constitutes "bacteriological cleanliness" and his wisdom in ensuring it. About 90 per cent. of the deterioration of milk and cream is of bacteriological origin, due chiefly to faults in the cleansing and sterilizing of utensils and the observance of sanitary measures during milking. Clearly, then, a widespread and keener appreciation of the fundamentals of dairy hygiene is of great economic importance.

For over two years instructional work in clean milk production, supported by the scientific testing of milk supplies on receival at factories, has been in progress among suppliers to cheese factories on the Darling Downs. The ability of most producers to profit from the advice given is generally shown by markedly improved quality tests towards the termination of the instructional period. Unfortunately, there is a tendency for some suppliers to revert to less careful methods, a practice which discounts the efforts of conscientious producers.

With the object of fostering uniformity of methods, a dairy shed hygiene chart, chiefly for milk suppliers to cheese factories, has been devised. The aim in its preparation has been simply to cover essentials. The procedures recommended have been thoroughly tried out under ordinary farm conditions for a period of over twelve months on the farm of Mr. Malcolm McIntyre with excellent results, reflected by periodical quality tests made on the milk supplied to the factory. It can be safely asserted that by the consistent application of these tests, the production of milk which will produce cheese of good commercial quality is assured. Even by a partial application only on a mass scale by the suppliers to the Mount Tyson cheese factory, excellent results have been achieved, as reflected by the following official gradings for the cheese output during the period, April, 1940, to January, 1941, inclusive:—

	Per cent.
Choice grade	91
First grade	9
Second grade	Nil

The regular and systematic examination (say weekly) of milk by the methylene blue test should be a corollary to the use of the chart amongst suppliers, for an unsatisfactory test will indicate to a producer that there is some weakness in his methods and then by reference to the chart he will be in a position to ascertain the fault and take steps to rectify it forthwith.

Extensive field experience has shown that the accuracy of the modified methylene blue test in revealing a satisfactory milk for cheese making is so closely allied to the Wisconsin curd test and subsequent cheese quality that it warrants general application for educative purposes, and as a standard milk grading test at all cheese factories.

The technique has been prepared primarily for milk suppliers to cheese factories, but with slight modification would be suitable for suppliers of cream to a butter factory, as similar general principles apply in each case. The chief additional points which require attention by cream suppliers are:—

1. *Separator Parts.*—Completely dismantle all parts twice daily. Thoroughly cleanse and scald or sterilize with steam. The separator parts should be steam sterilized for at least two minutes by placing them, with any other small pieces of equipment, under the milk vat and preferably on a well-drained metal stand. Finally, the utensils should be placed on an approved metal draining rack away from yard dust: if desired, the draining rack may be in the sun.

2. *Cooling of Cream.*—The use of a tubular metal cooler, through which water is circulated, followed by trough cooling in a concrete cooling trough in a dairy is advised.

3. *Cream Blending.*—Proper blending of cream from different milkings is important. Do not mix hot cream with the cool cream from a previous separation until the animal heat has been withdrawn.

4. *Stirring Cream.*—Stir the cream from time to time while it is held in the dairy.

Dairy Shed Methods Chart.

(1) Care should be taken to see that all cows in the herd are in a sound, healthy condition.

(2) Milk should not be supplied to the factory until ten (10) days after calving.

Milking procedures to be carried out during the night's milking operations.

(3) Flush out milking machines, milk cans, and all utensils with cold water drawn from the sterilizer, to which an approved quantity of "chlorine compound" has been added, before commencing milking operations.

(4) Wash cows' teats and wipe well. Check carefully each teat, to make sure that milk is normal, before putting on the machines.

(5) Water for washing teats should be drawn from the sterilizer and chlorine compound added in quantities recommended by the makers. Change water frequently when dirty.

(6) After use, teat cloths should be thoroughly washed, then treated with boiling water from the sterilzer, and effectively steamed with the utensils and hung out to dry.

(7) After removal of machines, strip cows thoroughly. Aim to practise dry milking. Milker's hands should be kept in a clean condition. A dish, soap, and towel to be provided for this purpose.

(8) After completion of milking at night, flush out machines first with cold water (drawn from the sterilizer before firing it) followed by hot water to which an approved quantity of cleanser has been added, and finally boiling water drawn from the sterilizer. In each case use not less than one (1) gallon water per unit. Lift unit up and down in water to permit of thorough flushing.

(9) Thoroughly wash all utensils with fairly hot water to which cleanser has been added; then finally scald.

Procedures to be carried out after the morning's milking.

(10) After completion of milking in the morning, flush out machines first with cold water (drawn from the sterilizer before firing) followed by hot water to which an approved quantity of cleanser has been added, and lastly boiling water drawn from the sterilizer, using in each case not less than one (1) gallon of water per unit. Then thoroughly steam milk pipe line after having first drawn through it a brush or rolled up bundle of horse hair.

(11) Thoroughly wash teat cup assemblies, and all utensils in fairly hot water with cleanser added, followed by effective steaming of all parts (each set of teat cups to be steamed separately). Store all utensils in the sun during the day, in a place as far as possible free from dust contamination.

(12) Machines should be dismantled and thoroughly cleaned and sterilized regularly.

(13) Air lines should be flushed out and effectively steamed at least once a week.

Milk Treatment.

(14) Milk should be passed over an approved cooler or aerator night and morning and strained through wad filters. Night's milk should be distributed in half cans and left in an approved milk stand over night. Milk should be stirred after milking and again later, using a standard milk stirrer.

(15) Night's and morning's milk should not be mixed before delivery to the factory.

(16) Milking should be completed as early as possible in the mornings and milk delivered promptly—being protected during transit with a regulation canvas can cover.

(17) Milk cans should be washed promptly on arriving back from the factory. In no case should this work be left over until later in the day.

Method of Washing Cans.

(18) First rinse cans with ample cold water to remove surplus whey. Wash thoroughly both inside and outside with fairly hot water drawn from sterilizer with cleanser added. Follow this by a scalding rinse to remove cleanser. Finally, steam sterilize each can for two (2) minutes. Cans should be stored upside down on a draining rack (preferably one constructed of galvanised piping) away from yard dust pollution; this rack may be in a sunny position, if preferred.

(19) Eliminate the use of wash-up cloths in the dairy cleansing. Good quality brushes should be used, and sterilized daily after use.

(20) Care should be taken to see that milk cans and all utensils, especially the rubber-ware used in the machines, are kept in good repair. Renewals should be made promptly where necessary.

(21) Bail floors should be washed daily. Manure should be removed from yard daily and efforts made to abate dust nuisance.

Myoporum acuminatum (Strychnine Bush).*

A PLANT POISONOUS TO STOCK.

JOHN LEGG, D.V.Sc., B.Sc., M.R.C.V.S., Senior Veterinary Officer, and
C. T. WHITE, Government Botanist.

THIS is a plant with a wide distribution in Australia, and from our knowledge of the plant, the term may include more than one species because the plant is of variable appearance. It is a shrub 4 to 6 feet in height—or a small tree—with glossy green leaves, which are bitter when chewed. It has small white flowers and the fruit is globular, about ¼ inch in dameter, and purple in colour when ripe. Because of the bitter taste of the leaves it is rarely eaten by stock. (See Plate 26.)

Plate 26.
STRYCHNINE BUSH (*Myoporum acuminatum*).

It is known by the name of "strychnine bush" and is a close relation of the Ellangowan Poison Bush (M. deserti) of Western Queensland, which is known to be a serious poison plant.

* Contribution No. 13 from the Poison Plants Committee, Department of Agriculture and Stock, Queensland, established as the result of a grant from the Australian Wool Board for the purpose of conducting investigations with plants suspected of being poisonous to stock.

It has been suspected several times in Queensland as being poisonous, and recently the stock inspector at Biggenden (Mr. Sigley) drew our attention to stock losses which were occurring in his district in areas where the plant was growing profusely. At the time the losses occurred, drought conditions prevailed and feed was scarce in the district and there was some evidence that the cattle were eating this plant. Not being able to determine the cause of the mortality from an examination of the animals which had died and which presented certain characteristic changes, such as congestion of the lungs, it was decided to carry out experiments to determine whether the plant was poisonous or otherwise.

For this purpose plants were sent to the Animal Health Station, Yeerongpilly, and feeding experiments were performed on sheep. These experiments were carried out by making the animals ingest a small quantity of the plant each day.

As a result it was found that amounts even as small as 1 lb. were quite sufficient to cause death in sheep. At the same time the characteristic changes, such as congestion of the lungs, &c., which were noted to occur in natural cases in cattle, were also produced in sheep.

MAN'S NEVER-ENDING WAR AGAINST INSECT PESTS.

Man's war against insect pests is never-ending. Is it a question of the survival of the fittest, we wonder? If it is, the argument is in favour of the insect. The cockroach, for instance, was, we are told, on this earth a million years before man made his appearance; therefore, it is likely to be here a million years after man has joined the moa and the mastodon. The cockroach came with the Coal Age. Its first home was in Asia; it travelled by ship to Holland, and later settled all over Europe. As the cockroach migrated all over the world, so with other insects. In Queensland almost every pest of sugar-cane has been imported. On the other hand, the entire Hawaiian cane crop was once threatened by the Australian cane-leaf hopper. These pests, of course, have their natural enemies—just as well for us!—but that's no reason why we should allow ourselves to be lulled into a false sense of security. The fact remains that only in a comparatively few cases have we won the battle against the bug. The job of keeping insect pests in check is a permanent job in which we cannot afford to let up. The importance, then, of every farmer co-operating whole-heartedly in every measure of pest control cannot be over-emphasised. Regarded rationally, the question of insect pest control is actually a matter of man's survival on this planet.

Soil Erosion.*

By H. W. KERR.

THE earth's fertile soil has been truly described as a capital asset which man, by his activity, can preserve, augment, or destroy; and the preservation of this fertility must be the foremost aim of every true agriculturist—it is the very foundation of any permanent agricultural structure.

The farmer who produces his crops under conditions of tropical temperatures and rainfall knows only too well the difficulties which attend any attempt to observe this dictum. These are conditions which promote the highest degree of activity of soil organisms, which quickly destroy crop residues and operate against the accumulation of soil humus. The ready release of plant foods in this way proves most beneficial to the growing crop, but the heavy rains of the wet season lead to the rapid removal of these foods by leaching, unless the crop roots are first able to absorb them.

These facts have been clearly appreciated by thinking farmers and soil scientists for a long time; but it is only of recent years that it has come to be realised generally that the fabulous fertility of tropical soils is a mere figment of the popular imagination; and that, though sometimes rich at first, they have not the ability to retain their riches which are very often dissipated at an astonishing rate.

So we understand why our cane growers of the wet tropics must devote so much attention to liming, to the purchase of artificial manures, and to those other practices which make for the conservation of a productive soil. They are merely waging war with the prodigality of nature, brought about when man upsets the delicate balance which exists between soil and vegetation on the virgin lands. But there is sometimes created in addition a set of conditions which leads to a tenfold acceleration of even this speedy process of fertility depletion. Not only is the plant food drained away by leaching, but the soil itself is removed as a body; and where this process has gone on to any pronounced degree, man is powerless to call a halt. As President Theodore Roosevelt once said: "When the soil goes, man goes, too."

The process known as soil erosion has been aptly described as the "tragedy of the death of soil fertility." Though it is only recently that many Australian farmers have become aware of the existence of this menace, it is not by any means an occurrence solely of modern times. The remains of old civilisations like those of Mesopotamia, Greece, and Northern Africa doubtless came as a result of the degradation of fertile soils which led to the formation of desert; and at the present time overstocking in Africa, due to so-called "modern" advances in knowledge, is creating its own problem in this continent, which is probably the most severe sufferer from erosion.

But perhaps the world's outstanding example of erosion damage is supplied by China. On the rich alluvial lands of that country cultivation has proceeded unimpaired by erosion. This has been possible due to the care of the farmers to return organic refuse, and in other ways

* Address delivered at Meringa Sugar Experiment Station, at the joint Field Day and Sugar Technologists' Agricultural Session, 19th April, 1941, and reprinted from *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock) for July, 1941.

minister to the needs of the land. On the slopes, however, wide areas of loessial soil have been completely denuded and ruined by washing, over many centuries. Attempts to stem the losses, by terracing, have merely slowed down the process, and erosion still goes on.

Position in U.S.A.

In the United States of America the destruction of fertile lands by wind and water erosion provides what is probably the major problem which that country now faces; and all this has been brought about in a mere century or so, by ill-guided agricultural systems which did not observe the necessity for soil preservation. Originally, only some 2½ per cent. of the land area was classed as desert, but in the course of two or three generations nearly one-half of the forests have been cleared, and a large part of the prairies, from the Rockies east, has been brought under the plough. Retribution has been astonishingly swift. Recent surveys showed that 10 per cent. of the total land area of the United States has lost more than three-quarters of its topsoil, 30 per cent. has been moderately eroded, and 4 per cent. has had most of its topsoil blown away by dust storms.

Coming nearer home, we find that over-grazing in South Australia has destroyed the vegetation and wind erosion has commenced its work. In New South Wales, Victoria, and even on our own Darling Downs water erosion is leaving its mark, and Governments are grappling with this preventable problem. For man must realise that he cannot be a parasite on the land; he must enter into partnership with the soil—giving as well as receiving; and the results of efforts to control this menace will determine the future of soil fertility.

Causes.

A careful study of causes may reveal the steps to be taken to prevent the trouble, for it is everywhere recognised that this is definitely a trouble where prevention is both simpler as well as more effective than cure. As water erosion alone concerns us in the sugar districts, attention will be confined to this phase of the problem.

It is a significant fact that erosion effects are generally much more prevalent in regions of moderate rainfall than they are in districts of very heavy precipitation. But one point must be clearly appreciated—erosion does not occur under conditions of natural jungle or forest cover. To make this statement is but to emphasise a truism; for otherwise the soil we find there could not have become established and developed to a state of maturity. Certainly geological processes lead to the gradual removal of, chiefly, exhausted material which has made its contribution to the fertility of the soil; but this takes place only at a speed equal to that of the process of soil formation. Sometimes the depth of soil extends to many feet, while at others it may only be a few inches. But this equilibrium is easily disturbed by man. Removal of the vegetative cover, unless this be done with due regard to all the consequences, and the influence of subsequent cultivation processes may so accelerate the denudation of the land that the result is disastrous. The amount of soil which takes a century to grow and accumulate may be swept away in a year—or even by a single storm. The problem involves, of course, the question of soil fertility in its broadest sense. It is not merely one of plant food supply, but the question of soil stability is intimately involved. When the soil becomes exhausted it becomes unstable, and is then moved bodily.

Vegetation's Aid.

We recognise then that the vegetation plays an all-important part in the preservation of the land. It protects the soil from the erosive effects of wind and rain. The loss of fertility and humus brought about by cropping or cultivation may possibly be made good by the use of fertilizers and the preservation of plant residues; but even these must fail if the agricultural system does not produce equivalent physical effects on the soil as did the natural vegetation. The deterioration of these factors provides the prelude for actual erosion. Very frequently a change of climate is blamed for a falling off in crops; but it is the land which has changed. The unstable soil is first removed by sheet erosion, and because this is not readily perceptible it often passes unrecognised. Later, small gullies become evident, and these rapidly grow until the land surface is heavily scarred and defaced. When this stage has been reached only drastic remedial steps possess any chance of success.

Plate 27.
SHOWING HOW ADVANCING SOIL, BLOWN BY THE WIND, IS WIPING OUT FARMS AND BUILDINGS IN U.S.A.

Extensive and intensive studies of erosion causes have been made in the United States, and are proceeding. It has been found that the cultivation of land with greater than 8 per cent. slope gives such heavy losses of topsoil that it should be kept under permanent grass. In other words, it is virtually impossible to preserve such land if it be cultivated at all. An interesting study carried out in Oklahoma showed that whereas land under grass lost soil annually at the rate of only 0·04 tons per acre, a similar field planted to cotton lost 39 tons per acre. These facts have been repeatedly demonstrated.

Of interest to cane growers should be the finding that continuous one-crop cultivation on slopes has been one of the most serious factors contributing to erosion losses. Cotton and maize are the chief offenders in that country. In Iowa it was found that even slight slopes in corn areas were losing topsoil at the rate of 60 tons per acre. Doubtless parallel conditions could be found in parts of the Queensland sugar

cane belt. Very often the moderate hillside slopes which are cultivated in areas, such as Innisfail and Childers, carry a deep red volcanic soil; and because of the almost imperceptible change in colour and texture from topsoil to subsoil, the loss of even a foot or more of the valuable surface layer may pass unnoticed. But evidence is readily to be found in the depleted productive capacity of the land, and oft-times in the fences or walls at the bottom of the slopes against which is piled much of the eroded fertile soil from the hilltop.

Plate 28.
Showing how Gully Erosion Develops from Sheet Erosion.

Plate 29.
Showing the Influence of Vegetative Cover.—The bare land (*right*) lost 500 tons of topsoil per acre, from a single storm; the protected land (*left*) practically none.

Prevention.

As with all diseases, the prevention of soil erosion is better than the cure; and it should be the duty of every farmer cultivating sloping lands to appreciate the several factors which contribute to the causes of erosion and to adopt those measures which will avoid its occurrence.

It is a happy circumstance that most of our best cane lands are alluvial in character and are thus not seriously subjected to this menace. However, where hillside slopes are cultivated for cane, the trouble is likely to be severely exaggerated. Firstly, the cane grower is usually a one-crop farmer; secondly, he is required to confine crop production to that area which is assigned for the purpose, and the regulations under which he operates enable him to harvest virtually 75 per cent. of this area annually. Finally, cane assignments have naturally been granted without any thought of the dangers of erosion damage. Such a combination of circumstances may therefore be very harmful. We have already indicated the menace of one-crop farming, and the period of rest which such land normally enjoys is a mere three to six months in, say, four years. This provides barely time for the growing of a leguminous cover crop, which, though definitely of great value, can scarcely be regarded as constituting a rotation system.

Plate 30.
Showing Extensive Gully Erosion in a Babinda Canefield.

Communal Problem.

There is abundant evidence to demonstrate that the erosion problem is not simply an individual matter; it is essentially communal in character, and obviously requires the attention and close supervision of a governing authority, whose duty it is both to educate the community in the accomplishment of its aims and in laying down the principles which must be rigorously enforced if necessity arises.

It is not possible, in the scope of this brief address, to do anything more than formulate the major guiding principles which have been established. The problem, as we have seen, is to prevent, retard, or regulate the removal of run-off water from the land surface, so that disturbance of the soil will not occur. To promote the maximum absorption of rain water, the soil should be maintained in a condition similar to that of the virgin land. Most cane growers should vividly appreciate

what this involves; it requires the maximum effort in conserving or building up humus, which is probably the most important single factor contributing to the retention at all times of an absorptive soil. Cultivation methods should be adopted with care, and intelligence applied in their performance. Though cultivation is good for the crop we have stressed repeatedly that it is bad for the soil; and though it is employed to offset the forces which tend to consolidate the land and destroy its tilth it in itself is a prime factor in breaking down the desirable "crumb" structure of the soil, and in the production of hard pans which seriously obstruct the ready uptake and percolation of water in the soil. It has been demonstrated under a range of conditions that erosion losses have been maintained at their lowest level where hillsides can be cropped without recourse to work with implements. Deep grubbing is the most desirable operation on hillsides, if cultivation must be done, as it can be employed to open up the soil to the greatest depth while breaking down the ill-effects of surface tillage implements.

Plate 31.
Illustrating the Commencement of a Headland Gully on a Tully Farm.

In spite of everything that might be done to promote the most complete absorption of rainfall, there will always occur deluges which would seriously overtax the absorptive power of even a deep sandy loam. The complete prevention of run-off is thus impossible. Provision must therefore be made to take away the water in such a manner that the soil is not damaged in the process.

One relatively simple expedient for holding moderate amounts of run-off water is the use of contour furrows, the soil from which provides low ridges extending across the slope at suitable intervals. These trap the run-off water from above and hold it until it can be absorbed. This system is found most useful with non-cultivated crops such as grass, but it fails in its purpose, and may even aggravate the damage if the furrow becomes speedily filled and overflows; the position may be disastrous if this should happen before the ridge becomes consolidated and protected.

Make Terraces.

The most successful plan under such conditions is the construction of terraces. Briefly, this consists in converting the slope into a succession of wide, practically level benches, with a short, though steeper drop from one terrace to the next below. More complete details of terrace construction will be found in the chapter of the "Cane Growers' Handbook" devoted to this subject. This plan assures the maximum opportunity for the absorption of the rainfall on the flat surface, while the slope, though steep, is so short that the water flowing down it does not attain such a speed as to cause the removal of much soil to the terrace below.

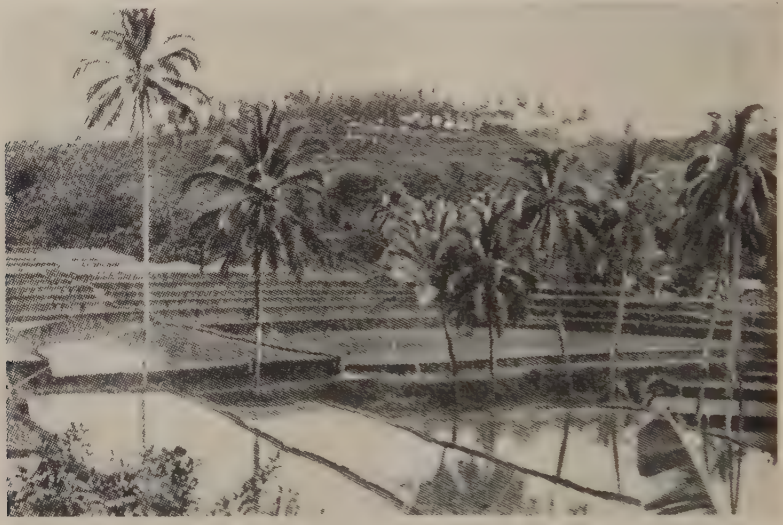


Plate 32.
Showing the Terracing for Rice Culture, which is a Feature of Hillsides in the East Indian Islands.

Precautions, of course, must be taken to provide for the removal of excessive water and its conduction to natural drainage courses at the lower levels. The terraces are therefore given a slight slope, usually from the centre to both sides, of the order of 6 inches per 100 feet. Further, the terrace usually has a slight slope backwards from its outer edge, to avoid the stream cascading down the slope. Finally, the terrace should terminate in a well-defined gully, which serves to take care of inevitable run-off; these gullies are protected against erosion by grassing, by the installation of stone, wooden, or even earthen dams, or by the use of any other obstruction which will check the velocity of the water.

We have no knowledge of the adoption of the terrace system in the sugar areas of Queensland; but farmers on gentle slopes are urged to give this plan their serious consideration. When properly constructed, terraces offer no problem to the use of cultural implements, as the usual methods can be carried out without any heed to their existence.

One or two points are most important in attempting any earth sculptural methods such as those just discussed. Firstly, earth ridges or terraces are most vulnerable just after they have been built, when the soil is loose and incoherent. They should therefore be constructed at such times as heavy downpours are most improbable. They thus have

a chance of becoming firmed and bound together before they are tested by flood rains of the wet season. Secondly, the job should always be commenced at the top of the slope and never at the bottom. Many farmers choose to spread the work over successive seasons, so that only a proportion of the terraces or furrows is liable to washing at any one time, in the critical period which precedes consolidation of the soil.

Plate 33.

CONTOUR BANKS SUCH AS THESE ARE EFFECTIVE IN CONTROLLING SLIGHT SLOPES.

Plate 34.

SHOWING THE SIMPLEST METHOD OF COMBATING SHEET EROSION: STRIP-CROPPING WITH ALTERNATE STRIPS OF DIFFERENT CROPS

Cane Growers' Advantage.

There is one important respect in which the cane grower possesses a distinct advantage over other farmers cultivating slopes. He has not to plough out each year, after the crop is harvested, while the trash and tops are available to assist in erosion control. The value of the latter

factor is not at all well appreciated under these conditions. Its conservation provides a mulch which controls weeds and eliminates excessive cultivation. When compacted by rain it offers strong resistance to removal by running water; it thus checks the velocity of flow in much the same way as the leaf mould, roots, &c., did on the virgin land; while the water which is shed flows rather from the trash than from the soil, and the latter is thus protected. Finally, it leads to increased soil fertility, and an improved physical condition in the land, which make for successful ratooning, and the less frequently such areas require to be disturbed by ploughing, the better for the soil and its safety. Many northern growers object to this policy, because they claim it leads to increased borer damage to the crop; but our entomologists have made it clear that this occurs chiefly when a few well-recognised precautions have not been taken. It is admitted, however, that for hillside conditions, a hardier cane variety with a strong rooting system and ratooning capacity is definitely needed. This is a responsibility which our plant-breeder will not overlook.

Plate 35.

Illustrating the Use of a Leguminous Vine (Kudzu) in Protecting Gullies against further Erosion.

I might also make reference at this time to the plan of "strip" or "contour farming" which many farmers have adopted overseas as a means of minimising erosion damage. When it was recognised that the cultivated crop is the worst offender, a plan was devised for laying out the farm in narrow strips running at right angles to the slope, with alternating cultivated and non-cultivated crops in the successive strips. Any tendency to excessive erosion is thus checked when the running water encounters the area of grass or other non-cultivated crop; its velocity falls, and the load of sediment which it may carry is largely deposited once more. Though this does not eliminate erosion, it certainly guards against serious loss of soil from the farm.

This scheme may have limited application in the cane areas; but it should not be overlooked and may prove very useful in those places

where standover cane is grown. A strip of cane which is to stand until the following year will provide useful assistance in preventing serious erosion losses from the immediately adjacent cultivated fields above and below it. In more serious circumstances it might be well worth while interposing narrow fields of some permanent grassland between canefields, and after a period of years changing over from cane to grass and from grass to cane.

Perhaps further points of interest will be brought out in our subsequent discussion; but I would like, in closing, to stress that the land of this great continent is merely held in trust by the individual, for future generations; the robber agriculturist must therefore be eliminated and soil exploitation prevented.

Mr. Bulcock's Address.

In opening the discussion, Mr. Bulcock delivered an interesting address on his overseas experiences in connection with soil erosion. He stressed the severe and lasting effects of soil erosion on the land and said that in Australia we are not as yet face to face with this problem in its most serious form. The effects have been most apparent in countries which have been practising agriculture for many years. Serious erosion in South Africa was chiefly the result of overstocking. In the United States of America most interesting phases of erosion were apparent. Control methods employed there were much more comprehensive than in any other country and involved as a first angle of approach the prevention of further erosion. This involved contour furrowing and terracing. He had been assured that terracing had had a beneficial effect quite apart from the erosion control aspect, resulting in a 47 per cent. increase in productivity in one case which he quoted. Mr. Bulcock described the method of treatment for gullies by the provision of a dam at the lowest point, thus causing a deposition of soil; this practice had given remarkable achievements in restoring land to its previous levels.

It was suggested by Mr. Bulcock that prevention measures be taken here where it was considered desirable. He believed a soil erosion consciousness would be created in this State, and he felt sure that the co-operation of those vitally concerned would be readily forthcoming. He considered that vegetation constituted the most efficient method of protection. He stressed that attention should be devoted to the preservation of trees, the provision of belts of trees, the preservation of grass lands and the vegetation of creek beds, and the desirability of a shallow finish at the end of the ploughing of the field. He thanked the chairman for the opportunity of addressing the gathering on this subject.

Value of Sugar as Feed for Stock.

HITHERTO the Queensland sugar grower and manufacturer has had only one serious obstruction to the disposal of his entire production—that of unprofitable price: but the present disturbed world situation has introduced the difficulty of crop marketing, and there exists a distinct possibility that some cane crops may in the near future be left unharvested. This raises the two-fold question which is engaging the attention of all thinking cane farmers—what can be done with excess production and to what purpose can spare land be put to supplement the farm income?

In this respect there is something of interest in an article published in a recent issue of "The Philippine Agriculturist." It records the results of a pig-feeding trial conducted at the College of Agriculture, in which raw sugar was incorporated in the ration of two of three groups of animals. The feed formulæ employed were varied somewhat with the age of the pigs, but at all times a constant relationship was maintained between the corn and sugar utilized. The average percentage of these constituents were—

	Lot. 1. Per cent.	Lot. 2. Per cent.	Lot. 3. Per cent.
Corn	25	12·5	nil
Sugar	nil	12·5	25

The feeding trials extended over a period of 210 days. The animals were fed their ration twice daily, and at other times were allowed to run in the paddock. They were weighed weekly.

The results show that the pigs which were given half-and-half corn and sugar (Lot 2) recorded the most rapid gain in weight throughout. The difference between the remaining lots was of no significance. It was actually found that the mixture was 14 per cent. superior to either maize or sugar. On the basis of the figures presented, it is concluded that with corn at £9 per ton (4s. 6d. per bushel) sugar was only slightly more expensive as feed when priced at £15 per ton! It is suggested also that sugar could be used profitably, in competition with maize alone, if the price of the sugar did not exceed £13 per ton.

While it is not proposed that raw sugar should be manufactured for this purpose in Queensland, these data are certainly arresting. They do indicate, at least, that the sugar cane crop may have a value as supplementary pig (and, perhaps, other stock) feed. It has been reported by a prominent cane grower in Southern Queensland that he has had experience of turning brood sows on a plot of standover Co.290. The animals made an excellent job of cleaning up the field and actually completed the first step in preparing the field for replanting. If the pigs thus harvest their own fodder little or no cost is involved in this method of crop disposal. Doubtless much of the juice from the cane would be lost in the process, but this could be avoided if the farmer would harvest and chaff the cane. Cane alone cannot, of course, be regarded as a satisfactory sole feed for growing pigs; however, it is evident that at least 25 per cent. of the ration might be made up in terms of the sugars of the juice.

—H.W.K. in *The Cane Growers' Quarterly Bulletin* for April, 1941.

Influence of Wind on Plant Growth.

IT has been pointed out that in regions of strong winds, the growth of sugar cane in the outer rows is markedly affected by this adverse condition. Such a state of affairs existed at the Bundaberg Station before the southern boundary of the farm was protected by a giant privet hedge. This hedge has developed to such an extent that the depressed cane growth on the outer margin of the adjacent block has now disappeared.

Similar evidence of wind effects is demonstrated in a remarkable manner in the accompanying picture (Plate 36).

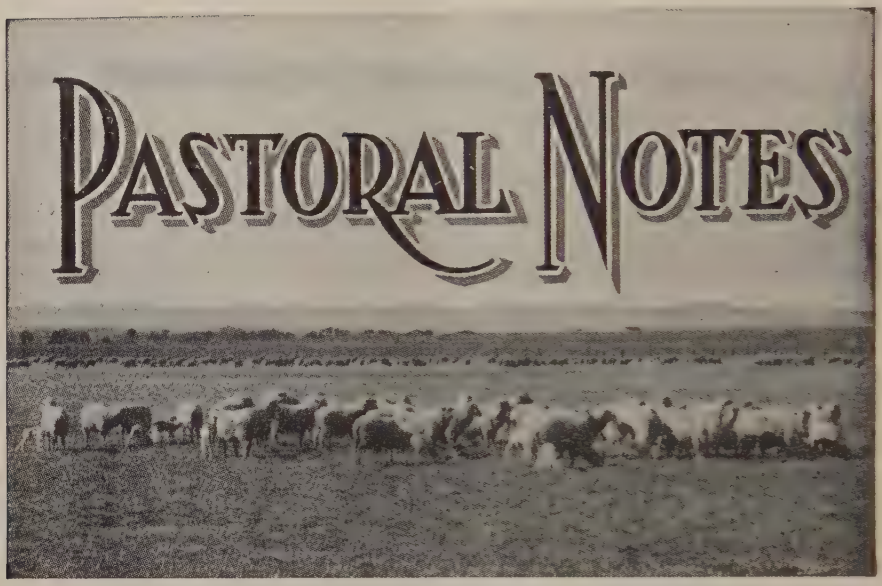
Plate 36.

Illustrating the Effect of Wind Protection on Growth of Poinciana Trees: Note Stunted Specimens in the Foreground.

A row of poinciana trees was planted on the Mackay Sugar Experiment Station a few years ago. They were in an exposed position, and made very poor progress. About two years ago, the seedling hothouse was built, and the three trees which were given protection from the south-easterly wind by the structure immediately made normal development. The two remaining trees in the foreground (*see* Plate 36) have retained their straggly, unthrifty appearance, and this is attributable to the strong wind effects to which they are exposed.

These facts should suggest to farmers the desirability of providing tree growth about the farm in such a way as to break strong winds. Not only does it provide useful shade for animals and enhance the appearance of the property, but it returns dividends in improved crop growth.

—H.W.K. in *The Cane Growers' Quarterly Bulletin* for July, 1941.



Sheep for Small Holdings.

SHEEP should have a permanent place on any farm on which conditions are suitable. One of the advantages of sheep is that they provide two distinct sources of income annually—wool and mutton—besides their natural increase.

In Queensland, merino sheep constitutes about 97 per cent. of our total number. This breed is especially adapted to conditions in the Central and Western districts of the State, but when forced to breed and develop in an unsuitable environment, constitutional weakness is a real risk.

British breeds have been developed and maintained under conditions where environment has influenced adaptability to Queensland conditions. In mixed farming districts these breeds—especially the pure-bred rams—can be used with advantage. The Corriedale originated in New Zealand, and the improvement of the breed has been progressive both there and in Australia. In Queensland, the Corriedale is regarded as a dual-purpose sheep coming between the merino and pure British breeds, overlapping both in adaptability to a considerable degree.

In sheep breeding, local conditions should decide the system of production.

Sheep breeding under diversified farming conditions where the British breeds are used is entirely different from merino breeding in the West. The merino is bred under purely pastoral conditions, and the progeny is retained for wool and mutton production. With the imported mutton breeds, the aim of the farmer is to dispose of the progeny at the earliest marketable age. To do this successfully, two major points should be observed:—

(1) The use of pure-bred rams of quick-maturing qualities suitable to location and conditions.

(2) Availability of suitable pasture or cultivated crops for ewes as soon as their lambs are dropped, and for topping off the lambs.

Other considerations of importance are the suitability of the ewe flock for wool production as well as for breeding; economy in pasturing the ewe flock from the time the lambs are taken off until the next drop of lambs; the general health of the flock and freedom from parasites, fodder provision for carrying the flock successfully through periods of scarcity; and culling of the breeding flock for age while they are still capable of being fattened and sold at a profit. To start successfully in breeding, whether for wool, mutton, or for fat lambs, healthy sheep are essential. This may mean paying more for young sheep, but it will generally prove the best and safest policy.

CATTLE FATTENING.

There are large tracts of well-grassed land in South-eastern Queensland on which fattening of bought store cattle is practised. These cattle are usually animals which fatten into "heavies." Older stock can "handle" roughage much better than yearlings, and it takes less time and trouble to get them ready for market; but, in general, they do not give as good a net return as "baby beef."

The reasons are:—

(1) Buying of stores is a more speculative business and the outlay greater.

(2) Disease, drought, and other retarding influences make the money loss, if any, greater.

(3) The trade does not favour "heavies."

(4) Although the relative cost per 100 lb. is higher with the "young stuff," more can be bought for the same money.

(5) The young animal lays on both flesh and fat—i.e., it fattens while it grows.

(6) The trade pays more for the finished carcase.

(7) There is *always* a market for well finished lightweights.

There are certain requisites for turning off baby beeves the year round:—

(1) On the part of the buyer, a sound knowledge of what "good doers" like;

(2) On the property—well-planned subdivision, improved pastures, cultivation, and fodder conservation.

Improvements require a considerable outlay of capital, but in all cases where management has been sound the returns have made it well worth while.

It should always be remembered that the improvements are permanent, and that they enhance the value of the property.

MERINO TYPES FOR COUNTRY AND CONDITIONS.

In merino sheep it is not always advisable, or even possible, to breed the type one would wish. To be successful, a farmer should realise that the type should be chosen to suit his country and local conditions. For instance, it should be obvious that the sheep carrying the clothing wools of Western Victoria would prove a failure in the western districts of Queensland.

In selecting a type, the first consideration should be constitution. In the West sheep frequently have comparatively long distances to go to water. A sheep then should be introduced that is fitted by nature to withstand this hardship. Judged from a financial point of view—and, after all, everything practical in the industry comes back to a matter of pounds, shillings, and pence—consideration should be given to the type of animal which gives the yield per head rather than price per lb.

Having evolved a type suitable to his particular conditions, it is important that the farmer should stick to the stud supplying the rams. It takes a man of experience in breeding to successfully maintain a flock while chopping and changing about from stud to stud.

Pay the price for the better-type rams and, if necessary, pay the right man to select them, having regard to the type of ewes with which they are to be mated.

LAMB MARKING.

For lamb marking all instruments should be sterilized. Tetanus is always a risk in old yards and sheds. If the work can be done in grassed yards the risk of the entry of tetanus and other germs is reduced considerably. On large holdings it is always advisable, when practicable, to do the work in the breeding paddock, where temporary dust-free yards can be erected.

Marking should be done in early morning or late afternoon, and the sheep should be released as soon after as possible, to avoid any risk from germ-laden dust. The correct age for marking is from two to four weeks. Care should be taken to sever the tail at a joint. An antiseptic dressing should be applied.

LOCKJAW IN HORSES.

From time to time valuable horses die from tetanus (lockjaw), and, in some instances, early attention might mean the saving of the animals. The financial loss to the owner is serious, especially when the loss is not covered by insurance. The loss in the case of the death of a valuable draught or thoroughbred stallion is a matter of community as well as of individual concern.

Once tetanus develops and symptoms become evident, it is almost impossible to save an animal. The symptoms are dilated nostrils, head poked forward and neck stiff, movements slow and hesitant, tail elevated and held straight out, and the third eyelid (haw) swinging backwards and forwards across the eye at the slightest noise. Clapping of the hands or opening of the stable door may produce the lastmentioned symptoms. In short, the animal appears stiff all over, is unable to bend the body normally, and is described as "swinging about in one piece like a ship at sea."

In horses, tetanus usually occurs as a result of some small injury, such as a punctured wound in the foot or any other part of the body. Stable manure is a most suitable medium for tetanus germs.

The incubation period in most cases, especially in horses, is one to two weeks. However, cases have occurred where symptoms have been observed twenty-four hours after infection. Preventive measures should always be adopted by thoroughly cleansing the wound and treating it with tincture of iodine or some other antiseptic. In cases of punctured sole or bruises, after cleansing the wound thoroughly and treating it with antiseptic dressings, plug the wound with tow soaked in tincture of iodine and bandage the foot to prevent the entrance of dirt. In all cases tetanus anti-toxic serum should be injected. It is not claimed that the inoculation protects the animal for any length of time, but the use of anti-toxic serum immunises the animal over the period in which infection might be gathered through an open wound.

THE CORRIEDALE IN QUEENSLAND.

It is not only in the Southern States that this valuable, dual-purpose sheep is attracting increasing attention.

Graziers in Queensland, especially on the fringe of the Downs, are advised to consider the establishment of a Corriedale flock. The main reasons for this advice arises from the fact that the pure-bred Corriedale lamb is a valuable animal, that the breed is far less susceptible to blowfly attack, and generally the returns from the Corriedale in comparatively small flocks compare more than favourably with merinos. The breed should be kept pure when this is possible. The main obstacle to action on this advice is obviously one of cost. Corriedale ewes are hard to come by and expensive when they are available. The constant use, however, of first-class rams mated with the largest, robust-woolled types of merinos will give quick results.

Systematic culling will greatly help in the establishment of a valuable flock of ewes. The wether section of the drop should be marketed as fat lambs if the season is favourable. Even in an unfavourable season, these male cross-breds make excellent wethers if a carry-over from the lamb stage is obligatory. The ewe lambs of the drop should be retained as future breeders.

SELECTING THE WELL SITE.

On many grazing properties in Queensland there is sufficient surface water to last until June or July in a normal year, and possibly until August in a good year, when there has been a heavy wet season. There is a period between the time that the surface water dries up and the first storms fall in which it is necessary to provide water, either by well or bore.

When selecting a site for a well or a bore, the grazier should first make a survey of his country. A site should, if possible, be selected on a part of the property where cattle do not feed intensively when surface water is available. On a number of grazing properties the mistake has been made of putting down a bore in close proximity to surface water. As the surface water dries up, the grass in the immediate vicinity is also eaten out, and when it is necessary to pump water

for stock there is often no grass in close proximity to the bore or well. As a result, the stock are forced to walk long distances to grass.

When bores and wells are put down in places away from surface water, there will probably be grass near at hand in a dry time, and cattle will do better, drink oftener, and retain condition that they would otherwise lose through excessive walking.

THE CORRIEDALE AND TYPE.

As in the Southern States, the Corriedale is fast growing in popularity in Queensland, and rightly so.

Some growers, however, lose sight of the reason for which this sheep was evolved—i.e., the strength of its covering. To grow merino counts on a Corriedale is to nullify, to a great extent, the most useful qualities of the breed. With the finer fleece invariably goes loss of size and constitution, and also diminished fleece weight.

The covering of a Corriedale should be a strong quality wool, full of character, of 54's to 56's counts in the case of rams, and only slightly finer in the case of ewes.

Strength without length in the breed is to be discouraged, as this makes for a common wool. Length must go with strength. Character and quality, too, must be insisted on if the lucrative prices given for good Corriedale wool are to be maintained.

As would be expected in a comparatively new breed, culling should be heavy to maintain quality.

In culling a Corriedale flock, it will be found that the vast majority of the culls come from two extremes, as it were. Those sheep showing Lincoln characteristics in too great a measure are not desirable, and, likewise, those leaning too much to the merino should be rejected. The happy medium between the two breeds with wool of the count indicated is the ideal. With this must go size and every indication of constitution.

BLOOD SMEARS FOR EXAMINATION.

When a grazier has lost several head of stock he is often obliged to take a blood smear from the remaining animals for examination in the laboratory at the Animal Health Station. This occurs particularly where such diseases as tick fever are suspected.

In taking a smear, use, if practicable, the small glass slides with which all stock inspectors are provided. If slides are not available, use any ordinary flat piece of glass such as a piece of broken window pane. In either case, the glass should first be thoroughly cleaned.

Puncture an ear vein after clipping and cleaning the ear. As the blood oozes out, *touch a small drop* and pick it up on the edge of one piece of glass. Then place the edge of the glass carrying the small drop of blood on the flat surface of a second piece of glass, holding the two pieces at an angle of approximately 45 degrees. By pushing the edge of the upper glass over the surface of the lower the blood spreads in a very thin film.

The edge of the glass carrying the small drop of blood should not be chipped or broken. It is essential that only a very small drop should be used, for too much blood gives a very thick film which is of little value in diagnostic work.

CATTLE DIPPING.

The dipping of cattle is sometimes treated casually in tick-infested areas, and this is not infrequently the cause of an unsatisfactory clean-up, and also of ill-effects on the stock such as scalding.

Cattle should be quietly driven to the dip and allowed to cool down in the yard before they are passed through the dipping fluid. "Rushing" is both unnecessary and undesirable. Cattle often tend to race back to the farm after treatment, but they should always be steadied down to a moderate pace.

Dairy cows are particularly susceptible to scald in the udder and injuries of this type frequently lead to difficulties in milking. Scalding is often attributed to too strong a dipping fluid; but the real trouble is more often the failure of the farmer to grease the sensitive parts of the udder before the cows leave the farm for the dip.

All the ticks may not be killed at one treatment, even when the dipping fluid is of standard strength. Ticks in the process of moulting may survive while travelling stock sometimes accumulate sufficient dirt and grime in the heavy winter coat to protect some of the more sheltered pests. Nevertheless, where reinfestation is not heavy, properly tended cattle should not be troubled by ticks for some time after dipping and the farmer cannot afford to neglect the only known method of coping with the pest.

STOCK DISEASE PREVENTION.

The object of disinfection is to destroy organisms and ultra-visible viruses which cause disease. It is a job which should certainly be done after the occurrence of one or more cases of contagious disease—such as tuberculosis, contagious abortion, swine fever, and influenza.

Periodical disinfection of stables, cow bails, piggeries, and poultry runs is highly commendable as a measure of disease prevention. The extent and thoroughness of the work would depend on the nature of the disease which had occurred, and would not need to be so extensive or intensive when merely carried out as a routine measure.

A common error in disinfecting premises is to first remove accumulations of excreta, discharges, dirt, and dust. As a consequence, the causal organisms and viruses contained in the accumulations are disseminated throughout the building, and may lodge in places which cannot be easily covered by the disinfecting solution afterwards. The proper way is first to apply liberally to all parts of the premises a suitable disinfectant in solution, and to leave it in contact for twenty-four hours. After the disinfectant has been allowed to act for that period, the walls and floors should be scraped (or scrubbed), and the scrapings soaked with kerosene and burnt.

Suitable solutions are phenol or other coal tar preparation (1 pint to 4 gallons water); chloride of lime (1 lb. to each gallon of water), or crude carbolic acid (1½ pints to 4 gallons water), to be sprayed on all surfaces.

If shearing sheds and yards are disinfected before shearing commences, losses of stock through infection of wounds may be avoided.

PALATABILITY OF STOCK FOODS.

While the cost of the ration fed to dairy cows is likely to influence its composition, consideration should also be given to the palatability of the feeds selected. Nothing should be fed to the animals which will affect the quality of the product yielded. What is suitable for one animal may not be suitable for another, and the method of using stock foods governs their value. For producing animals —i.e., animals converting the food eaten into some product such as milk—it is essential that they should eat sufficient. In order to guarantee this sufficiency, care should be taken to ensure that the ration fed is wholesome and palatable.

Unless the ration is palatable, cows and fattening pigs will not consume sufficient feed to permit the efficient production of milk and cream, and bacon. Unpalatable feeds which have to be fed to milking cows should be used sparingly and mixed with some other well liked feed. In this way, the bulk of the ration can be increased, the more palatable ingredients inducing the animal to consume the whole of the mixture. Roughage can be chopped and mixed with concentrates. The roughage often becomes softer and the mixture more wholesome and appetising by mixing it with a dilution of molasses.

It is only by feeding rations of a palatable nature that the maximum production can be obtained from live stock. At the same time, it must be remembered that an important function of farm animals is to convert into useful products material that would otherwise be wasted. By keeping a watch on the materials available, it should be possible to dispose of practically all the feed available in a way which will ensure the best return.

Feeding Whey to Calves.

E. B. RICE, Director of Dairying.

WITH the conversion of the product of many dairy farms from cream for butter-making to milk for cheese manufacture, the value of the by-product available for calf and pig raising will require some adjustment of the feeding methods hitherto operative on such farms. Strong healthy calves may be reared on whey provided it is fed in conjunction with suitable supplements and the usual precautions in successful calf-raising are observed. Acid whey is, however, quite unsuitable for calves, causing scouring and bloat, and has often been responsible for disappointing results. The development of acidity is retarded if the whey is subjected to heating by the cheese factory (as required by the Dairy Produce Acts) and its recontamination avoided. Whey held on the farm between feeding times must be kept in clean vessels in a cool, shady place.

Table I. sets out typical analyses of whole milk, separated milk, and whey.

TABLE I.

Composition of Whole Milk, Separated Milk, and Whey.

Constituent.	Whole milk.	Separated milk.	Whey.
	Per cent.	Per cent.	Per cent.
Water	87.00	90.55	93.91
Fat	4.00	0.11	0.35
Protein	3.25	3.39	0.10
Milk Sugar	5.00	5.20	4.60
Ash (mineral matter) ..	0.75	0.76	0.65

The variation in the food constituents of milk and its by-products is clearly reflected in this table. It will be seen that separated milk differs only markedly from whole milk in its deficiency of butter-fat. Whey, however, is deficient in protein, as well as butter-fat, both of which are won from the milk in the cheese-making process.

Suggestions for Feeding.

1. Remove the calf from its mother twenty-four hours after birth—when it will have had the benefit of its first drink of colostrum.

2. *First Week.*—Feed the mother's milk three times daily, commencing with 1 quart at each meal and gradually increasing until 1½-2 quarts are fed at each meal (the greater quantity for larger calves).

3. *Second Week.*—Feed whole milk (not necessarily the mother's milk) at the rate of 1 to 1½ gallons daily.

4. *Third Week.*—Gradually substitute whey for whole milk, the first day ½ lb. whey for milk at each feed, and progressively increase the amount of whey every few days until whole milk is entirely omitted from the ration by the end of the fourth week. Substitutes for the fat and protein lost from the original milk must also be provided in the third week. Fine grain meal (maize, oats, barley, grain sorghum, &c.) will suitably replace butter-fat, while linseed oil meal or meat meal will make good the protein deficiency. To teach the calf to take the cereal meal (maize meal preferably at the beginning), a few ounces are placed in the bottom of the feeding vessel after the milk has been drunk. The cereal meal is built up to 4 oz. in the first week, and thence a meal consisting of a mixture of grains is fed in increasing amounts every few days until the calf is receiving about 2 lb. daily. In a similar manner the protein meal is gradually introduced into the ration. If linseed oil meal is used, it must be mixed to a smooth paste with water, then more water added, and the mixture finally boiled for ten to twenty minutes before being fed to young calves. At first only a small quantity is given, and this is built up to 8 oz. to each gallon of whey fed.

Successful results in America have been obtained by feeding with whey a mixture consisting of 30 parts ground maize, 30 parts pollard, and 40 parts linseed meal or first-grade cotton-seed meal.

If meat meal is used, a suggested plan of feeding is—

Third week	1 oz. daily.
Fourth week	2 oz. daily.
Fifth week	3-4 oz. daily.
Sixth week	6-7 oz. daily.
Eighth week	8 oz. daily.

5. *Eighth Week.*—Water may now be substituted gradually for whey, and at the same time the protein-rich and cereal concentrates increased until 3-4 lb. are being fed daily, and the calf given free access to pasture or good legume hay. At this stage the supplementary feeding may be gradually discontinued and the animal allowed to fend for itself, but if good pasturage is not available, the feeding of increased quantities of concentrates or good legume hay is necessary.

General Rules.

Just as in rearing calves by any other method, certain rules require careful observance with whey-fed calves, the chief of which are—

(1) Maintain scrupulous cleanliness of feeding utensils, sheds, and yards.
(2) Avoid over-feeding.
(3) Feed all milk and whey at blood heat (98 deg. F.) for three months, thereafter at a slightly lower temperature, but not cold.
(4) Allow access to good pasturage or green succulent food after the third week.
(5) Supply ample clean, pure drinking water.
(6) Provide shade in summer and shelter in winter for young dairy stock.
(7) Provide a calf paddock.
(8) Give calves a mineral mixture consisting of equal parts of sterilised bone meal and salt.

Rigid standards for calf-feeding cannot be prescribed, as age, size, health, and vigour determine the requirements of each animal. Common sense and the special conditions applicable to each farm must be the guiding factors in rationing, but the suggestions contained in this paper are offered as a basis upon which a satisfactory system can be worked out.

Any further information on calf-raising will be supplied by the Department of Agriculture and Stock upon inquiry.

BITTER FLAVOUR IN CREAM—A SUSPECTED CAUSE.

A farmer, who for some time had been troubled with a bitter flavour in cream supplied to a butter factory, sought assistance with a view to finding out and remedying the defect. The taint invariably caused the cream to be de-graded from first to second, and, as an average of about eighty cows were milked on the farm all the year round, a great financial loss resulted from the de-grading of the cream. An inspection of the farm to ascertain the cause of the trouble

was made and the factory grader, who was familiar with the defect in the cream and who would be able to verify any suspected cause, accompanied the investigating dairy officer. A careful inspection revealed that the condition of the utensils and production methods followed on the farm were quite satisfactory and could not possibly be responsible for the bitterness in the cream. The feeds and method of feeding were also investigated, but no evidence could be found to suggest any likely cause of the taint.

However, during an inspection of the paddocks, where the cattle grazed, it was observed that a few trees, known locally as the Leichhardt tree, were growing. Pieces of the wood and leaves from this tree revealed an extremely bitter flavour, identical with that detected in the cream. Specimens of the wood and leaves from this tree were obtained. No evidence was seen of cattle having eaten leaves from this tree, but, nevertheless, some of the branches were within reach of the cattle. These trees have pods—which fall to the ground—and it is a theory that these pods are washed into little pools of water during the wet weather (the country is melon-holey) with the result that the soaking of the pods imparts the flavour to the water in these holes. As the cows on this property had been drinking this tainted water it is possible that the bitter flavour complained of was imparted to the milk and ultimately to the cream. This defect seems to occur during the hot, wet months of the year and this type of country would take many weeks to dry out again after heavy rain. Some of the wood from the Leichhardt tree was boiled in water and an extract obtained which had an acutely bitter flavour.

The Government Botanist, who examined specimens from the tree, reported that "the specimens represent *Sarcocephalus cordatus*, the Leichhardt tree or Canary Wood. The bark of this tree is known to contain a bitter principle. However, we have had no previous reports of this tree causing bitterness in dairy products. It is, of course, possible that litter from the trees falling into water which cows drink may give rise to bitterness in cream."

CLEANLINESS IN THE DAIRY.

The low standard of quality in some cream deliveries can be put down to carelessness on the farms or failure to use proper methods when washing dairy utensils.

Improper cleansing methods have always been a fruitful cause of second-grade cream. The cleansing of dairy utensils, if somewhat irksome, is not particularly difficult. From the point of view of cream quality, it is one of the most important jobs in the dairy; yet sometimes it does not receive the attention it warrants. This is due largely to the fact that the bacteriological aspect is not always properly understood. Because of climatic conditions in many parts of Queensland being suitable for bacterial growth, improperly washed dairy utensils result in a large amount of contamination of the cream supply, and consequently inferior cream. The object of cleaning dairy utensils and separator parts is not only to remove the milk or cream sticking to them, but also to kill all bacterial growth on them. The removal of the residue of milk or cream is not difficult, and is best done with proper brushes and warm water to which a small amount of washing soda has been added. It is important that all particles of milk or cream should be removed. Rags should not be used in the wash-up.

The next procedure is to kill the bacteria adhering to the utensils. The best method is by the use of heat in the form of boiling water or steam, and the boiling water treatment is the general method adopted. This is very effective when properly done.

To treat the utensils effectively, the water must be close to boiling point. Warm water is of very little value, and water which has been heated some distance from the dairy and left to stand at the wash-up bench for five or ten minutes after being taken off the fire cools off quickly to well below boiling point.

The most effective method is to place the separator parts and the smaller dairy utensils, after washing them properly, in the vessel used for heating water while it is still on the fire, making sure that the water comes to the boil. After five minutes, remove the utensils and hang them up or stand them in a clean atmosphere. They will dry thoroughly in a few minutes without the use of rags, and will be in perfect condition for the next milking.

It is safe to say that the percentage of inferior cream would be almost eliminated if these methods of treating dairy utensils were applied as part of the regular dairy routine and attention given to a few other details. By far the greater proportion of inferior cream is due to careless cleansing of utensils.

WHY CREAM TESTS VARY.

Some dairy farmers wonder why their factory returns show variations in the fat tests of their cream. Actually, variations are bound to occur.

Conditions under which milk is separated lead to changes in cream tests, as shown by the following facts:—

The separator should always be run at the speed directed by the manufacturer. It is better to turn at too high a rate than too low, for, in the latter case, the fat loss in the skim milk is increased in proportion to the decrease in the number of revolutions.

The milk must be allowed to enter the bowl freely during separation. The level is automatically controlled by the float, and if the flow is partly shut off a higher testing cream will result. An over supply will result in a lower testing cream, and, more important still, excessive fat loss will occur.

Milk is at the best temperature to be separated as it comes from the cow, as it is less viscous than at lower temperatures, so runs easily through the separator, and more perfect separation of the fat results. At lower temperatures, due to the viscosity of the milk, separation becomes more difficult with greater fat losses. It is doubtful whether any machine will do good work if the milk is below 80 degrees Fahrenheit.

The quantity of skim milk or water used to flush the bowl usually varies considerably from day to day, and may cause a variation in the test of 2 to 5 per cent., depending on the quality of cream. Vibration of the separator causes the skim milk and cream to be shaken together, so that they do not find their way to their respective outlets. Fat losses are increased by the escape of fat globules through the skim milk outlet.

Other factors which influence fat losses are the cleansing of the separator and the condition of the milk, but these should not cause any difficulty where there is a proper appreciation of the necessity of hygienic methods.

There is a daily variation in the fat content of the mixed milk from the herd, and this is sometimes appreciable. This affects the test of the cream, but does not influence the quantity. For example, if a herd produced 100 lb. of milk with a fat test of 4 per cent., there would be 4 lb. of butter fat, while, if the fat were 5 per cent., 5 lb. of butter fat would be the result.

QUALITY OF BUTTER AND CHEESE.

The dairyman should always bear in mind the fact that butter and cheese can be only as good as the milk from which they are manufactured. If milk of an inferior quality is produced, the butter or cheese factory cannot be expected to manufacture a first-class article.

Milk is the normal secretion obtained from the udder of a healthy cow, properly fed and cared for. Milk obtained during fifteen days immediately prior to, and ten days immediately following, calving, should be excluded from the bulk supplies. Milk should contain not less than 3.3 per cent. of milk fat, and must be free from any added water, separated milk, or preservatives.

Milk from cows suffering from mastitis, or any other disease of the udder, should not be used.

Cows should not be allowed to wade in or have access to stagnant water. The flanks should be brushed with a cloth when the animals come into the bails. Clean water and clean cloths should be used for the purpose of washing the udders and teats prior to milking, and the hands of the milkers should be washed before, and again after, milking each cow.

The first few drops of milk are usually contaminated and, therefore, should be milked into a tin and thrown away after milking. They should not be milked on to the ground, or thrown about the bails where they are liable to attract flies.

Musty feed must not be fed to cows. The animals should not be allowed to graze in paddocks known to contain weeds which will impart a detrimental flavour to milk, nor should they be fed highly flavoured foods immediately before or at the time of milking.

Dairy utensils should be thoroughly cleansed and scalded, then aired and dried in the sun in an inverted position.

Disinfectants, under normal conditions, should not be used in the dairy house or bails.

DAIRY CATTLE.

The difference in value of pure-bred and high-grade dairy cattle lies in the higher selling price of the pure-bred. Dairy farms which are so equipped that they can handle the record work effectively will find more profit in pure-bred than in grade cattle. There is a steady market for high-quality pure-bred cattle at prices which net good returns to the breeder. Whether pure-bred stock will show the best results with any particular dairy farmer depends, however, on his keeping authentic records, and also on his ability as a salesman. Pure-bred cattle which a breeder is unable to sell are no more valuable to him than an equal number of good grades.

A herd of carefully selected grade cows will produce as heavily as the average pure-bred herd, for the reason that they can be culled more closely, as their lower value does not encourage keeping an animal which is not a profitable producer. There is always a good demand for the female offspring at payable prices. Any person going in for dairying for the purpose of producing milk or cream, and not with the idea of gaining a large part of his income from the sale of stock, may do quite as well with grades as with pure-breds.

As in most things, success with dairy cattle depends on the individual farmer himself, and whether grade or pure-bred cattle are more desirable can be settled only when the particular conditions surrounding the individual case are considered.

It is sometimes stated that grade cows are better than pure-bred animals. This is not so, but it is true that some grades are better than some pure-bred stock.

One very important fact to remember, however, is that the herd sire should always be a pure-bred. Unfortunately, this is not sufficiently understood by some Queensland dairy farmers, and this accounts to a very large extent for the poor type of dairy cattle one sometimes sees when travelling through the country.

SORE TEATS IN MILKING COWS.

Sore teats cause much loss to the dairy farmer, and the condition should always be suitably treated on its first appearance. Chapped teats are caused by the sudden chilling of the teats after wet milking, after the calf has ceased sucking, or by contact with stagnant water, filth, or irritants when lying down.

The chapping may be slight, or, on the other hand, it may extend into gaping sores, inducing retention of milk or even causing mammitis.

Sore teats may be prevented by washing the udder and teats thoroughly with warm water and soap when the cow first comes in, carefully drying the udder before applying olive oil to the teats. If the cow already has sore teats, they should be washed with warm soapy water; then thoroughly dried and treated with carbolised vaseline. If the sores are extensive and the irritation great, the teats should first be washed with a solution of 1 dram of sugar of lead to 1 pint of rain water, after which benzoated zinc oxide ointment should be applied.

The careful use of a sterile teat syphon is desirable when the sores are very deep and painful, as manual milking opens the sores continually. Wet milking is a dirty and undesirable practice from every point of view.

CARE OF MILKING MACHINE AIRLINES.

In the course of farm visits dairy officers find that the airline on milking machines is often neglected, because some farmers do not realise its contaminatory influence. The defective quality of much machine-produced milk and cream is often largely attributable to this cause.

On modern milking plants the airline, like other mechanical parts, is simple to clean, but in some of the old-type machines it is very difficult to keep free from contamination. Milk of satisfactory quality can only be expected if the utmost care is given to cleaning the airline, as well as other parts of the plant.

Some careful producers flush out the airline daily, but investigations among suppliers to cheese factories have shown that milk of good quality can be produced with milking machines the airline of which is well flushed out and effectively steamed once weekly—twice weekly in the hotter months would probably be advisable.

Feeding Whey to Pigs.

T. ABELL, Pig Section.

WHEY is a good food for pigs, and if used in proper balance with other foods gives results similar to those obtained by feeding separated milk. Whey is lower in protein content than, and its total food value is approximately half that of, skim milk. (For composition of whole milk, skim milk, and whey, see Table I., page 143 of this issue.) This does not necessarily mean that twice the volume of whey must be fed to obtain similar results in pig feeding. As with skim milk, whey may be fed with success to all classes of pigs—from weaners to sows suckling litters—provided that the following recommendations are followed.

Whey must be fed while fresh, and should be kept as clean as possible. The whey should be collected frequently, and the containers used should be cleaned before each lot of whey is placed in them. Never put fresh whey into drums containing stale whey. The drums should not be left in the sun, and the tops should be covered with old bags or board lids to keep out flies. Dirty and stale whey is responsible for most of the digestive disorders occurring in whey-fed pigs, particularly weaners and stores.

Pigs should be given small amounts of fresh whey at about six weeks of age to accustom them to the ration they will receive when weaned. At this stage they should also receive a small amount of grain to chew. Start with about a pint daily per pig, and gradually increase the whey so that at eight weeks of age each pig receives about 1 gallon daily. The grain should have been increased to about 1½ lb. daily by this time. A week before weaning commence feeding a protein-rich food such as meat meal (60 per cent. protein) or first-grade cotton-seed meal. About one dessertspoonful is sufficient to start with, and this should be gradually increased so that when weaned each pig receives ¾ lb. daily. This amount of meat meal need not be increased as the pigs grow; the whey and grain are increased gradually till each pig is receiving 1 lb. of grain per 25 lb. live weight, and just as much whey as it will drink comfortably. The feeding of large quantities of whey to young pigs is responsible for the unthrifty pot-bellied appearance sometimes seen in whey-fed pigs.

Where possible, all whey-fed pigs should have access to pasture. If grazing is not available, they should have green food cut and fed by hand, or receive a small amount of lucerne hay or chaff daily; this is to make good any vitamin deficiency.

Minerals are also important in whey feeding; therefore, if the pigs are receiving cotton-seed meal instead of meat meal, and pasture or legume hay is scarce, a mineral mixture should be fed in small amounts. Two parts of sterilized bone meal to one of salt make an excellent mixture.

For pigs receiving wheat, barley, or grain sorghum as the grain portion of the ration the meat meal or cotton-seed meal may be eliminated by the time they

reach 120 lb. live weight, provided they are receiving pasture or lucerne hay. Pigs receiving maize, however, should continue to receive a little of the protein-rich concentrate.

Dry sows will do well on pasture or lucerne hay, as much whey as they can handle comfortably, and from 3 to 4 lb. of grain daily. Sows nursing litters will require much more food. They should be fed very sparingly for the first two days—on about 1 gallon of whey and 2 to 3 lb. of grain. Gradually increase the whey and grain until at the end of about ten days the sow is receiving as much whey as she can drink comfortably and 8 to 10 lb. of grain. The addition of ¼ lb. of meat meal is recommended if pasture or lucerne hay is scarce. Boars may be fed similarly to dry sows.

If cotton-seed meal is used instead of meat meal, it should be fed at the rate of 3 parts for every 2 parts of meat meal it replaces—e.g., to replace 4 oz. of meat meal, feed 6 oz. of cotton-seed meal.

Briefly, fresh clean whey, fed in conjunction with grain and other farm crops, together with pasture and a protein-rich concentrate, will give excellent results in pig-feeding. Any further information required on pig-feeding will be supplied upon application to the Department of Agriculture and Stock.

POINTS OF A GOOD BOAR.

When selecting a boar the best available should be bought, for during his life he may be the sire of hundreds of pigs, while the sow can only produce a limited number. If the boar is good he will improve the standard of the herd. His selection, therefore, is of very great importance.

The boar should come from a large, thrifty litter, and be obtained from a reliable breeder. He should be of correct type for mating with the sows, not too chunky or short, but showing full development at every point, strictly masculine, and fully typical of his breed. He must show quality, smoothness, and evenness in every part, have a typical masculine head, with eyes and ears wide apart, the jowl reasonably full and well laid on to the shoulders, which should be smooth and free from wrinkles. He should have a full heart-girth extending well down to the bottom lines, nearly or quite on a level, with as deep a flank as possible. He should possess rather short or medium length legs, with bone of fair size and quality, pasterns short and straight, and the hoofs well set, legs standing square, straight and well under him. A long, wide and deep ham, and tail well set up are also desirable characteristics.

ROOTS FOR PIGS.

Successful pig raising depends largely on the production on the farm of suitable root crops. The crops should be fed to the pigs on the paddock system which permits the animals to do some of their own harvesting, and also suits their natural inclination to graze and search for roots.

Under normal seasonal conditions, there are many root crops which possess a high food value and are more or less resistant to the immediate effects of dry weather.

Root crops recommended for pig feeding include sweet potatoes and English potatoes (after picking out the marketable potatoes, there always remain the small and broken tubers), Swede turnips, mangel wurzels, and several varieties of sugar beet. Arrowroot is worth consideration as a carry-over crop, while, in Central and North Queensland, varieties of cassava are worth cultivating in heavy types of soil which are less suitable for sweet potatoes. Of all these root crops, however, sweet potatoes are regarded by many pig farmers as the most useful.

In experiments conducted by the Department of Agriculture and Stock, Belgian field carrots gave results indicating that they are worth a trial. Onions are unsuitable for pig feeding. Jerusalem artichokes are not grown in Queensland to the extent that their importance as a pig food warrants. They are adapted to cultivation in a wide range of soils, although, like sweet potatoes, they do best in a deep loamy or sandy soil rich in humus and with plenty of moisture.

PIG BRANDING.

Under the Queensland Pig Industry Act, the identification of all pigs sold, offered for sale, bartet, or exchange, is compulsory. This is essential to satisfactory marketing of this class of stock, and where marking is carried out as a regular routine job, presents little difficulty. Identification facilitates investigation into disease, whether epidemic or otherwise.

The Act provides particularly for the marking of all pigs consigned to factories, and there has been widespread appreciation of its value. There may be differences of opinion in regard to the advantages of various systems of identification; but from a factory point of view it is a very great advantage to have the carcases plainly identified.

Exporters prefer the body tattoo as a means of identification, and bacon curers almost without exception are more than satisfied if the carcases are tattooed efficiently. The use of the firebrand is being superseded generally by the more efficient method of tattooing, in which a body tattooing instrument and marking paste or ink are used.

The marking of sucker, weaner, and store pigs presents greater difficulty, because neither the body tattoo nor the firebrand are sufficiently permanent where the pigs are to be retained on the farm for periods varying from two to five months. In the case of these young pigs, two systems are especially adaptable, viz., earmarking and ear tattooing, the latter being suitable only in the case of white or red coloured pigs.

The departmental pamphlet, "Identification of Pigs," is available free on application to the Department of Agriculture and Stock, Brisbane.

THE PADDOCK SYSTEM OF PIG RAISING.

Farmers who have not already adopted the practice are advised to give careful consideration to the advantages of running pigs on the grazing system as compared with the intensive penning system which, until a few years ago, was the recognised practice of most pig keepers.

There is little doubt that the old custom of confining pigs to small pens resulted from the desire to produce very fat carcases. Present day buyers demand leaner pork and bacon, so it is necessary to alter pig raising practice accordingly, especially in respect of breeding, feeding, and penning. Provided pigs are bred to the correct type—that is, pigs intended for light porkers bred from quick maturing stock, and pigs intended for baconers bred from later-maturing stock—they may be kept under grazing conditions from birth until fit for slaughter with very good results. Pigs kept in paddocks throughout their lives have a tendency to grow rather than fatten, and it is the lean, growing pig and not the fat pig which is required for meat.

When grazed, pigs find a lot of their food in the form of pasture or forage crops specially grown in the pig paddocks, and these foods usually require less labour and are cheaper than other pig foods. The pigs not only do their own harvesting but also return a good amount of manurial matter to the soil, thus maintaining or improving soil fertility.

With the run of a good paddock containing some pasture or green crop, there is very little chance of pigs suffering from mineral or vitamin deficiency. This is a decided advantage over the intensive penning system, in which ill-health often results from a lack of knowledge or care in attempting to supply a complete diet. Penned pigs often suffer from dietetic disorders, and when turned out on pasture recover rapidly.

Under the intensive system, it is necessary to have buildings, floors, and drains well constructed in order to maintain a safe standard of hygiene. This also means extra labour and water for cleansing pens.

There is little, if any, difference in the costs of establishing a good paddock piggery and a good intensive piggery. One of the most important features of a paddock piggery is that the work of tending the pigs is much more congenial, for the only cleaning up of the piggery consists of cultivating or resting the pig paddock and moving the sheds and troughs, which should be built on skids to allow of easy transport.

Probably the most practical method of controlling worm infestation in pigs is to run them in paddocks which can be cropped, fed off, and ploughed in rotation. This system and the use of movable equipment is a very satisfactory method of pig raising under Queensland conditions.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
W. T. Burden, 44 Drayton road, Toowoomba	Harristown ..	White Leghorns, Australorps, and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
W. C. Carlow, Upper Brookfield	Adaville ..	Australorps, White and Brown Leghorns
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
F. Farrier, Miller road, Birkdale	Glenwood ..	White Leghorns
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
F. E. Hills, Sims road, Bundaberg	Littlemore ..	Rhode Island Reds, Australorps, White Wyandottes, White Leghorns, and Langshans
C. Hodges, Kuraby	Kuraby ..	White Leghorns
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington ..	Australorps, Rhode Island Reds, and White Leghorns
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
Miss K. E. Jenkins, Phillip street, Sandgate	Brooklands ..	Australorps, White and Brown Leghorns
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
A. E. Mengel, Campbell street, Toowoomba	Glenmore ..	White, Black, and Brown Leg-Leghorns, Anconas, Australorps, and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Coopers Plains	Norups	White Leghorns and Australorps
C. O'Brien, Hugh street, Townsville	Paramount ..	White Leghorns and Rhode Island Reds
H. Obst and Sons, Shepperd ..	Collegeholme ..	White Leghorns and Rhode Island Reds
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah.. ..	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns and Australorps,
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Witty, Boundary road, Kuraby	Witty's ..	White Leghorns
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

HOUSING COCKERELS.

In the rearing of any large number of cockerels, either for breeding or table purposes, one of the outstanding problems is that of providing satisfactory housing. It happens frequently that cockerels are injured by fighting among themselves. Generally speaking, fighting is more prevalent among light breeds, such as white leghorns, than among australorps and other heavy breeds.

The rearing of a large number of cockerels of a similar age could be arranged to great advantage by the provision of a special house. The type of house recommended is one in which the roof reaches approximately 2 feet from the ground. For efficiency, economy, and simplicity of construction, a building of the gable-end type should meet requirements. The size, naturally, will depend on the number of birds to be accommodated. A building 12 feet long by 8 feet wide will accommodate, as a maximum, 100 white leghorns or 80 australorps. Approximately one square foot of floor space is allowed for each bird. Hens, however, should be provided with double that area under the same system, and the small space proposed for the cockerels is only practicable because of the fact that they will occupy the house only for a short period.

In the construction of such a building, the four corner posts may be 3 feet, and the two centre posts 7 feet high. By using 8-feet iron the roof will extend to within 2 feet of the ground. The gable-end should face to a point between north and east. This will permit of the front being left uncovered, while the rear or westerly end should be covered with iron to within 2 feet of the ground. Perches are the only fittings necessary. These should be all on the same level, and 3 feet above the floor. They should run lengthwise, and should be spaced 2 feet apart. Such spacing would obviate fighting on the perches.

It is essential for a building of this type to be erected in the centre of a large netted run, or at a distance from other buildings if the birds are to be reared on free range. In addition, it is advisable to erect a number of perches in different parts of the run. Such perches should be 3 feet high and situated away from boundary fences.

The advantages of this system of handling cockerels are that there are no corners or walls in the building, and on being chased the bird can escape easily by getting on a perch. An old cock bird placed in the pen, before the cockerels are three months of age, will assist materially in preventing the young birds from fighting.

How to Make and Fill a Trench Silo.

A FEW important points in the construction, method of filling, and emptying of a trench silo are briefly given for the benefit of interested farmers.

Select a reasonably level and well-drained site as near the place of feeding as conveniently possible. Mark it out according to the capacity required. A trench 30 feet in length, 8 feet wide at bottom, 12 feet at top, and 8 feet deep, having an outslope at each end of 1 in 3 grade, would hold approximately 45 tons. By altering the length and retaining the other measurements, the capacity may be increased a ton for each additional foot length.

To construct the trench, excavate according to the desired dimensions, using plough and scoop and depositing the spoil along either side to back up the logs, which should be placed lengthwise to raise the walls 2 feet above the surface. Complete the job by trimming the walls smooth with mattock and spade.

The cost of construction involves labour only, and the time taken would vary according to the nature of the ground. In ordinary circumstances, two men equipped with suitable plant should excavate a trench of 45-ton capacity in about two or three days.

In filling the trench silo there is no necessity to chaff the material, full-length crops being loaded in the field and drawn through the trench, off tipped, and spread in even layers lengthwise, the empty vehicle passing out the other end. Thus each layer is consolidated as a result of the trampling of the horses' action throughout the whole filling process.

Should the crop be at all dry through over-maturity or as a result of frost, a sprinkling of water may be added during the filling process. The filling should continue well above the surface, forming a parapet of about 3 feet high, sloped towards the sides of the trench.

Complete the filling by covering it with grass well watered, finally topping with a 9-inch to a 12-inch layer of earth.

The material so stored will be fit to use as silage in from two to three months after filling, if so desired, or it may be safely stored for many years without undue deterioration or loss.

To remove the silage for use, the trench should be opened up at one end, taking the earth and grass covering from a portion only as required, and cutting down vertically with a sharp implement, such as a spade or hay knife. When a complete face section from top to bottom has been removed, an adze may be used to slice off additional material in a semi-chaffed or short-chopped form, resulting in its being in a more acceptable condition for feeding direct to stock without further preparation.

The silage may be fed as it is to practically all classes of stock. For cows in full milk, however, better results are obtained by the addition of a small quantity of protein-rich fodder and concentrate—such as lucerne chaff and cotton-seed meal.

Further particulars about silos and silage may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

WINDBREAKS AND SHELTER TREES ON THE DARLING DOWNS.

For the comfort of stock in cold weather, windbreaks are a necessity, especially on open plain or high tableland country. In timbered country, provision should be made for windbreaks when the land is being cleared by leaving suitable stands of the original forest covering; otherwise, the expense of establishing shelter belts will have to be incurred later on. Meanwhile, stock will have to suffer all the discomfort caused by winter's frigid westerlies, which blow usually for days on end.

In country which has already been cleared the planting of suitable trees on the prevailing windward boundaries of farms on tablelands, plains, and undulating country is, therefore, worth serious consideration. If edible trees are planted they might be used in times of drought. A farmer would naturally hesitate before destroying shelter trees for feeding purposes, but, if the necessity arises, edible trees may be lopped without destroying them.

The undermentioned trees are mainly suitable for planting on the Darling Downs. Edible types are the kurrajong, bottle tree, Portuguese elm, honey locust, and carob bean. Less palatable trees are the cypress (*Cupressus torulosa*), *Pinus radiata*—commonly known as *Pinus insignis*—white cedar, and *Bauhinia hookeri*. The well-known and admirable western tree, the wilga, should be added to this list if it is available in the local forests. Although there is a considerable amount of variation in the palatability of individual trees, the wilga is both a useful and extremely ornamental species.

In most cases the trees mentioned can be purchased from nurserymen. In the event of expense proving an obstacle to adequate planting, the trees can be raised from seed in an improvised nursery on the farm. The seeds could be germinated in shallow boxes or tins about twelve months before the young trees are required for planting. In frost-free areas June, July, and August are suitable months for planting out the young trees in their permanent locations. Some protection must, however, be given to the plants in frost-susceptible districts if midwinter planting is attempted.

Protecting the young trees from stock is most important. If the trees are planted near a boundary fence, it might be found most convenient to erect a second inner fence to keep stock away from the trees until they are high enough to be out of reach. Smaller farm stock, such as sheep, can be let into the enclosure once the trees have attained sufficient height for their foliage to be above the reach of the animals.

WINTER-GROWING RHODES GRASS—A RISK.

Although warnings that the so-called winter-growing or frost-resistant Rhodes grass is a potential source of danger to grazing stock have previously been issued, some farmers may not yet be aware that this grass should be grazed with caution. Winter-growing Rhodes grass should not be confused with the more common Rhodes grass which makes a very valuable pasture.

The prussic acid content of winter-growing Rhodes grass has been determined in samples collected both in Queensland and in New South Wales, and the quantity found was sufficient to indicate that the grass may sometimes be toxic to animals. Little is known about the conditions under which stock losses due to ingestion of the grass may occur, and stockowners are advised to be very careful when paddocks of the grass are being grazed.

In districts where high-yielding winter-growing grasses and clovers can be grown, the use of the winter-growing Rhodes grass for grazing purposes is not recommended.

SALT FOR THE HORSE.

A good farm horse is well worth his feed. Most farmers realise this, but all too frequently plough horses may be seen licking the dried sweat from each other. Working horses are incapable of sustained effort without a liberal supply of salt, and when the food is low in this mineral they try to remedy the deficiency by licking the saline deposit from evaporated sweat round the collar, saddle, and other gear of a team mate.

It is, therefore, sound practice to keep rock salt in a convenient place for working horses.

CERTIFIED POTATO SEED.

Although good seed is a prime consideration in the successful cultivation of potatoes, a large quantity of inferior seed is marketed annually in Queensland, and the following information is intended, therefore, as a guide to farmers in the purchase of good-quality seed potatoes at a reasonable cost.

In the past, the quantity of high-quality certified seed has been limited, and this factor has had a bearing on the low average returns per acre obtained, particularly from the early or spring crop, when growers have to rely on seed purchased from southern States.

Growers specialising in the selection of certified seed endeavour to obtain tubers from healthy, vigorous plants of good type and varietal purity and reasonably free from mechanical and insect injury.

The selection of plants free from virus diseases also is important, for, although such diseases will cause a marked degeneration, their presence may not be revealed by the appearance of the tubers.

The growth and sale of seed potatoes in New South Wales is now undertaken by the Certified Seed Potatoes (N.S.W.) Co-op. Ltd., 52 Bridge street, Sydney, of which the secretary (Mr. J. L. Shute) has supplied the following list of registered certified seed growers' associations, from which seed can be obtained for present seasonal plantings:—

Location.	Variety.	Secretary.
Bannister	Factor, Katahdin	J. Gorman, Bannister
Batlow	Factor, Katahdin	Batlow Packing House Co-op. Society, Batlow
Cotta Walla	Factor	J. Kennedy, Cotta Walla
Guy Fawkes	Factor	J. W. Hartman, Guy Fawkes
Guyra	Factor, Early Manhattan, Late Satisfaction	H. S. King, Glenroy, Guyra
Millthorpe	Factor	Roy Moad, Fairview, Millthorpe
Oberon	Factor, Katahdin	F. J. Gibbes, Oberon street, Oberon
Orange	Factor	Orange Producers' Co-op. Society, Grange
Redground	Factor	R. M. Broderick, Pinedale, Laggan
Taralga	Factor, Katahdin	J. J. Moloney, Taralga

The New South Wales Department of Agriculture controls the inspection and certification of potatoes, and has delegated the packing and distribution of such seed to the association mentioned.

For the present season, the price of certified seed has been fixed at £9 per ton, f.o.r. at growers' railway stations.

Certified seed potatoes from the southern States may also be procured through the agency of seedsmen and produce merchants in Brisbane and elsewhere in Queensland.

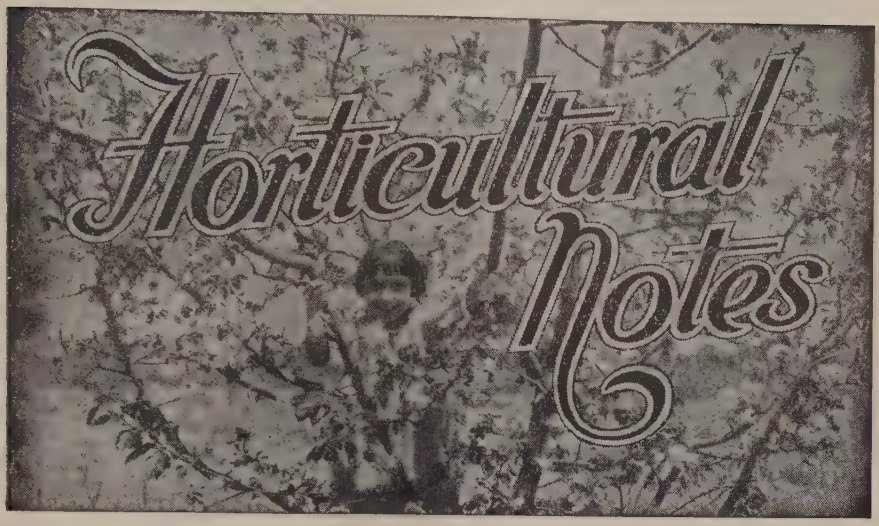
Any extra cost incurred in the purchase of certified seed is more than offset by the value of the resultant crops.

PARA GRASS FOR SWAMP LANDS.

Throughout a considerable stretch of the northern coastal country swampy areas of lesser or greater extent are encountered, particularly in the wetter regions where dairying is now being developed. These lands, to a large extent lying idle, could, at no great cost, be utilised by planting them with para grass. This grass is easy to establish, because of its habit of rooting freely at the nodes. It is a rather coarse, vigorous grower, but has succulent stems and leaves and gives a large quantity of green material per acre. Under favourable conditions, yields over 30 tons per acre have been obtained in one year. It is easily cut back by frost, and is, therefore, most suitable for the warmer localities.

This grass grows well in swampy localities, the runners going out even into deep water. Once established, it holds its own with any other grass. It has a further advantage in that it is credited with completely drying out marsh lands.

Para grass is usually propagated by runners, which root readily. These runners can be easily planted in furrows about 3 feet apart and about the same distance between the rows.



Cabbage-growing for Market.

THE cabbage is one of the most important vegetables for the market gardener. It grows best in the cooler districts, but by carefully selecting varieties the crop may be grown in most parts of Queensland.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. The soil, if heavy, should be improved by the addition of sand or decayed vegetable matter; if poor and sandy, the addition of a loamy soil or well-rotted manure will be beneficial.

The surface of the bed should be fertilized and firmed, and the seed sown thinly in shallow drills about 4 inches apart. After sowing, mulch the bed with well-rotted leaf mould to prevent excessive evaporation of moisture.

The seed-bed must be watered regularly, for a check in the growth of young seedlings is often followed by unsatisfactory results.

When large enough to handle, the seedlings should be thinned to an inch apart, for if grown too thickly they develop into long, spindly, weak plants.

Shading during the hottest part of the day is often necessary, but this shade should be removed as soon as the plants are strong enough to withstand the heat. Overshading also produces spindly plants. Approximately 1 lb. of seed will provide sufficient plants for an acre of cabbage.

In about six weeks the young plants should be large enough for transplanting. They may then be hardened off by restricting water supplies for a day or two before their removal to the field. Transplanting should be done in cloudy or showery weather, but if weather conditions are unfavourable the young seedlings should be watered in, and, as a further precaution, the top half of the leaves may be trimmed off to lessen transpiration until the root system is established.

Loosening of the soil in the seed-bed with a fork before lifting the plants helps to save many of the small roots. If the bed has been well soaked previously, the plants will lift with a ball of soil adhering to the roots, which will help to keep them moist.

The roots of the young plants should be kept damp after removal from the bed, and this may be done by standing them in a bucket containing a puddle of soil and water.

In planting, a hole is first made in the ground with a dibble—an old spade or digging fork handle is suitable. The hole should be only deep enough to allow the roots of the seedling to reach the bottom of the hole. Turn in a little earth, and then draw the plant slightly upwards before pressing the soil firmly around it. This ensures that the main root will not be doubled up.

The plants should be in rows 3 feet apart; in the rows the smaller varieties should be spaced 2½ feet and the larger varieties 3 feet apart. The growth of cabbages should on no account be checked. Regular cultivation and watering are, therefore, essential.

The right varieties should be selected for different times of the year. Winter-planting types should be early and quick maturing.

In the cooler areas, seed of the early varieties is sown during autumn. Main crop varieties are sown between August and December. The coastal districts are best suited to the winter crop.

Cabbage should be marketed as soon as possible after cutting, and only good, firm-hearted vegetables should be sent for sale. Care in handling is essential, and when placed in bags for railing they should be packed as firmly as possible.

Recommended varieties are:—

Early.—Early Allhead and Early Drumhead, both of which are large, early, and quick growers.

Main Crop.—Succession is the most popular variety, and may be grown almost any time. It is a good large Drumhead type.

Surehead is slightly larger than succession. It is hardy, and may be planted closer in the rows, as it has fewer outside leaves.

CONTROL OF CABBAGE PESTS.

In common with other crop plants, the cabbage is subject to the attacks of a number of insect pests which, if not adequately controlled, are capable of completely destroying the plants or at least rendering them unfit for market. Every grower should know these insect pests, and should be prepared to carry out the necessary control measures. It is now generally recognised that, as a health safeguard, a poison such as arsenate of lead, formerly in common use, must not be applied to edible foliage. As there is available on the market a range of insecticides containing derris which is toxic to most leaf-eating insects of the cabbage but non-poisonous to man, the use of arsenate of lead on this type of plant is unnecessary. Derris is sold under various trade names ready for application as a dust, or in a form suitable for mixing into a spray, and is marketed by most dealers in insecticides.

During the period of seed-bed growth the young plants should be given frequent applications of derris in either spray or dust form. Such treatment will reduce any incipient infestations of cabbage grubs or cabbage aphis.

In the field the young transplants may be destroyed during their early stages of growth by either cutworms or false wireworms. Both of these insects feed at night, the young plants being usually cut down at ground level. Cutworms are particularly injurious in the spring months, but damage by false wireworms has been experienced at other times in the year. Whenever this cutting of seedlings is noticed, an immediate application of the well-known cutworm bran bait should be made; late afternoon is the best time for the application.

The commonest insect pest of the half to full grown plant is the cabbage moth, whose caterpillars eat numerous holes into the foliage. The caterpillars are small, green in colour, and owing to their activity when disturbed, they are often referred to as green wrigglers. This insect breeds more rapidly in the summer, but it may be found on the plants throughout the year.

Thorough application of derris sprays or dusts once a week on the plants throughout their period of field growth will give adequate protection against this insect and also prevent any noticeable infestations of cabbage aphis. This aphis usually occurs in clusters of small, slow-moving insects covered by a whitish mealy secretion, the clusters being associated with curled and malformed foliage. These insects feed by sucking the sap, and both because of the malformation and the lowered vitality of the plant that accompany infestation, their control is necessary.

In the summer months a caterpillar generally referred to as the centre grub is frequently serious. This insect may burrow down the centre of young transplants into the stalk, and thus kill out the growing point. As the root system of

the plant is usually established by this time, a number of suckers will be produced. By cutting away all but the best of these, a satisfactory plant may later be produced. Derris applications are less effective against this insect than against larvæ of the cabbage moth.

Unfortunately, the corn-ear worm occasionally causes serious injury to cabbages. The only line of attack that can be suggested is to grow cabbages as far as possible from alternative host crops, such as tomatoes, maize, and cotton, and to eliminate weed growth in and near the cabbage area.

As general measures, crop residues should, as far as possible, be gathered and destroyed at the end of a crop and, if practicable, successive plantings should not be made on closely adjacent areas. These precautions will reduce the carry-over of the various insects.

CONTROL OF WHITE LOUSE OF CITRUS.

White louse of citrus occurs throughout the State, and although temperature does not appear to be an important factor determining its abundance, there seems to be reason for believing that it prefers dry climatic conditions. All portions of the tree are subject to attack, but infestation generally starts on the trunk near ground level and spreads upwards. The male scales are a very conspicuous white colour, and as they are much more numerous than the female scales, a colony of this species produces a white appearance on the infested surface which has led to its being given the quite appropriate name of white louse.

It is not a difficult insect to control, but growers should remember that vigorously growing trees are much less susceptible to attack than trees in poor health. The health of infested trees should, therefore, be attended to in order to reduce susceptibility, and whatever adverse factor is impairing their health should be eliminated so far as practicable.

Spraying with lime-sulphur gives a very good control of white louse. Control is generally best accomplished by spraying in the late winter just before blossoming, using lime-sulphur at a strength of one to fifteen. The preference for lime-sulphur is based very largely on the fact that its application is attended by other beneficial results in addition to establishing control of white louse.

When the correct time for spraying has arrived certain late-maturing varieties, e.g., the Valencia late, may still be carrying fruit. This does not really matter very much because usually only the inside parts of the tree require spraying. However, should the harvesting of the crop have been completed, then it is desirable that the whole tree be sprayed.

Fumigation with hydrocyanic acid gas also gives a good control of the white louse, and can be employed against it when conditions render fumigation practicable.

PREPARING LAND FOR SPRING PLANTING OF PINEAPPLES.

The early preparation of land for the spring planting of pineapples is desirable, and areas to be planted should be ploughed now, as deeply as the implements available and the depth of the surface soil will permit. If possible, this ploughing should be followed by at least one subsoiling to a depth of 18 inches. On no account should the subsoil be brought to the surface. The land should be left in the rough for some time; and, later, ploughed and cultivated to an even tilth. It will then be in good condition for planting at a favourable opportunity in the spring. It should be borne in mind that a stand of pineapples remains in the ground for several years, and, consequently, deep cultivation should be done before planting.

Adequate preparation, as suggested, improves both the aeration and moisture-holding capacity of the soil and thus enables root growth to develop under the most favourable conditions. This is most important, since the first few months of the life of a pineapple plantation largely determine its productivity. Furthermore, as has been amply demonstrated, vigorously growing plants are highly resistant to disease.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

THIS season has provided probably the finest display of cauliflowers ever seen. Tomato growers also are producing some excellent fruit, although heavy losses have been experienced. Prices for coloured tomatoes are at high levels on all markets. Growers should take care to have only coloured fruit in their consignments. With the cooler weather experienced at this time of the year the risk of loss is small.

Pineapples and papaws should be showing plenty of colour before picking. As tropical fruits do not ripen in the cold southern climate, they should be advanced in colour before harvesting.

Prices during the last week of July were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 6s. to 12s. 6d.; Sixes, 9s. to 14s.; Sevens, 11s. to 15s. 6d.; Eights and Nines, 13s. to 16s.; bunch, 1½d. to 9d. dozen.

Sydney.—Cavendish: Sixes, 11s. to 15s.; Sevens, 14s. to 18s.; Eights and Nines, 17s. to 22s.

Melbourne.—Cavendish: Sixes, 11s. to 15s.; Sevens, 12s. to 17s.; Eights and Nines, 14s. to 18s.

Adelaide.—Cavendish: 16s. to 20s.

Brisbane.—Sugars, 1½d. to 5d dozen; Lady Fingers, 3d to 9½d. dozen.

Pineapples.

Brisbane.—Smooths, 3s. to 6s. case; 1s. to 4s. 6d. dozen. Roughs, 3s. to 5s. case; 4d. to 2s. 6d. dozen.

Sydney.—7s. to 10s. Some improvement showing in colour standards.

Melbourne.—8s. to 12s. Some fruit backward in colour.

Adelaide.—10s. to 13s. case.

Custard Apples.

Brisbane.—2s. 6d. to 6s. half bushel. Supplies short.

Sydney.—4s. to 7s. 6d. half bushel.

Papaws.

Brisbane.—Locals, 2s. to 5s. bushel; Gunalda, 4s. to 5s. bushel; Yarwun, 5s. to 7s. 6d. bushel and half.

Sydney.—6s. to 13s.; specials higher.

Melbourne.—10s. to 16s.; specials higher.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels, 5s. to 9s.; Commons, 4s. to 8s. bushel.

Melbourne.—Valencias, 6s. to 12s.

Mandarins.

Brisbane.—Emperor, 5s. to 10s.; Glens, 6s. to 12s.; Scarlets, 4s. to 9s. Ellendale, 8s. to 13s.

Sydney.—Good-quality Mandarins are selling at satisfactory rates, but Brisbane prices should be more payable with less risk.

Lemons.

Brisbane.—5s. to 11s. bushel.

Melbourne.—6s. to 10s. bushel.

Grape Fruit.

Brisbane.—3s. to 7s. bushel.

Melbourne.—7s. to 12s. bushel.

OTHER FRUITS.

Avocados.

Brisbane.—7s. to 9s. half bushel.

Strawberries.

Brisbane.—5s. to 9s. dozen boxes; some specials to 12s. dozen.

Sydney.—2s. 6d. to 5s. tray; 6s. to 12s. dozen boxes.

Passion Fruit.

Brisbane.—First grade, 6s. to 8s.; Specials to 11s.; Seconds, 2s. to 5s.

Sydney.—6s. to 8s.; specials higher.

Melbourne.—7s. to 10s. half bushel.

Tomatoes.

Brisbane.—Coloured, 5s. to 9s.; Ripe, 3s. to 7s.; Green, 2s. 6d. to 6s.

Sydney.—South Queensland: Coloured, 9s. to 12s.; specials higher; Green, 8s. to 9s.; Bowen, 5s. to 8s.

Melbourne.—Queensland, 7s. to 10s.; West Australian, 8s. to 15s.; Adelaide, 20s. to 24s. half bushel.

VEGETABLES.

(Brisbane prices only, unless otherwise stated.)

Beans.—Brisbane, 10s. to 15s. bag; poor lines lower; Sydney, 5s. to 10s. per bushel; Melbourne, 5d. to 8d. lb.

Peas.—Brisbane, 6s. to 11s.; Melbourne, 6d. to 9d. lb.

Cauliflower.—1s. 6d. to 5s. smalls; 5s. to 13s. dozen large sizes.

Cabbage.—2s. to 12s. dozen. Specials higher.

Carrots.—3d. to 1s. 6d. bundle.

Beetroot.—6d. to 1s. 3d. bundle.

English Potatoes.—2s. 6d. to 3s. sugar bag.

Sweet Potatoes.—2s. to 3s. sugar bag.

Cucumbers.—10s. to 12s. bushel.

Rhubarb.—1s. to 1s. 6d. bundle.

Celery.—Local, 9d. to 2s. 6d. bundle.

Chokos.—1s. to 1s. 6d. dozen.

Marrows.—Brisbane, 2s. to 5s. dozen; Sydney, 8s. to 9s. case.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled during the month of June, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
Mature Cow (Standard, 350 lb.).				
Alfa Vale Midge (346 days)	W. H. Thompson, Nanango	17,878·75	672·478	Reward of Fairfield.
Newlands Empress 2nd (349 days)	J. F. Evans, Malanda	16,998·6	648·201	Greyleigh Sunbeam
Rosenthal Choice 15th (365 days)	S. J. H. Mitchell, Rosenthal	12,054·34	489·874	Rosenthal Musket
Trevlac Rosette	W. J. Freeman, Trevlac, Rosewood	11,600·5	489·675	Butter Boy of Railway View
Evansvale Bonnie 2nd	J. F. Evans, Malanda	10,972·45	471·070	Malanda of Glenore
Trevlac Fussy	W. J. Freeman, Trevlac, Rosewood	10,242	422·263	Butter Boy of Railway View
Braemar Billow	R. Ashford, Pittsworth	8,996·9	403·401	Braemar Keeper
*Ruby of Hawthorn	G. H. and E. E. Couchman, Warra	9,688·49	386·277	General of Croydon
Fairlie Fuschia 15th	C. B. Mitchell, Rosenthal	8,873·93	381·003	Fairlie Minor
Senior, 4 Years (Standard, 330 lb.).				
Pineville Jean	A. C. Bell, Owens Creek, *via* Mackay	10,652·5	341·207	Arley Lorna's Renown
Junior, 4 Years (Standard, 310 lb.).				
Alfa Vale Model 11th (365 days)	W. H. Thompson, Nanango	17,096·2	748·195	Reward of Fairfield
Senior, 3 Years (Standard, 290 lb.).				
Trevlac Miss Hinkler	W. J. Freeman, Trevlac, Rosewood	8,907·5	386·257	Trevlac Hinkler
Junior, 3 Years (Standard, 270 lb.).				
Penrhos Peach 16th	Alex. Sandilands, Penrhos, Wildash	7,872·75	328·370	Rosenthal Surprise
Cedargrove Lady Sal 19th	P. D. Fiechtner, Pilton View, *via* Greenmount	8,415·5	308·597	Cedargrove Trump
Cedargrove Thelma 3rd	P. D. Fiechtner, Pilton View, *via* Greenmount	8,570·25	307·722	Cedargrove Winlad
Senior, 2 Years (Standard, 250 lb.).				
Alfa Vale Pansy (365 days)	W. H. Thompson, Nanango	16,236·7	745·518	Reward of Fairfield
Bingleigh Melody 11th	J. C. Meier, Bingleigh, Mount Mort	10,164·0	403·04	Blacklands Patrol
Blacklands Jinny 11th	Estate of P. Doherty, Box 31, Gympie	8,362·35	381·003	Parkview Vice-Roy
Junior, 2 Years (Standard, 230 lb.).				
Bingleigh Miss Jean	J. C. Meier, Bingleigh, Mount Mort	10,211·0	421·612	Blacklands Patrol
Fairvale Judy 5th	J. H. Anderson, Fairvale, Southbrook	7,151·58	310·154	Fairvale Czar
Agatha of Pinelands	R. Ashford, Pittsworth	7,620·24	301·489	Corunna Marshall
Trevor Hill Caramel	Geo. Gwynne, Umbiram	7,047·26	296·142	Corunna Supreme
Melba of Pinelands	R. Ashford, Pittsworth	7,582·62	272·063	Corunna Marshall
Pinelands Butterfly 2nd	R. Ashford, Pittsworth	7,023·15	262·021	Corunna Marshall
Faversham Dahlia 3rd	G. H. and E. Couchman, Warra	6,071·33	261·701	Faversham Rex
Trevor Hill Lilac (224 days)	Geo. Gwynne, Umbiram	6,430·36	243·742	Corunna Supreme

JERSEY.

Mature Cow (Standard, 350 lb.).

Langside Hurette's Hope	S. H. Caldwell, Walker's Creek, Bell	8,409·74	488·806	Masterpiece Yerribee of Brucedale
Lermont Duchess	J. Schull, Lermont, Oakey	7,838·9	467·694	Woodside Golden Volunteer
Oxford Best's Dolly	S. H. Caldwell, Walker's Creek, Bell	7,816·86	404·247	Oxford Best
Oxford Bowler's Dolly	S. H. Caldwell, Walker's Creek, Bell	7,185·86	384·773	Oxford Bowler
Brooklodge Garnet 2nd	J. Cummings, Upper Nerang	6,893·25	354·967	Pineview Model

Senior, 4 Years (Standard, 330 lb.).

Trecarne Jerseymaid 3rd	T. Petherick, Lockyer	7,386·25	408·926	Trinity Some Officer
Maylands Princess	J. R. C. Taylor, Rocksdale, Walkerston	7,341·9	317·550	Trinity Noble Crown

Junior, 4 Years (Standard, 310 lb.).

Oxford Pleasure	J. Sigley, Millaa Millaa	7,967·8	363·709	Oxford Golden Lad
Homesdale Glorious	J. Cummings, Upper Nerang	5,960·5	328·844	Homesdale Chieftain

Senior, 3 Years (Standard, 290 lb.).

Trecarne Sometot	T. Petherick, Trecarne, Lockyer	6,969·3	456·930	Trinity Some Officer
Trecarne Safety 2nd	P. H. Schull, Woodview, Oakey	6,355·3	360·454	Trinity Some Officer

Junior, 3 Years (Standard, 270 lb.).

Lermont Marigold	J. Schull, Lermont, Oakey	5,974·9	364·430	Woodside Golden Volunteer
Bellgarth Countess 2nd	D. R. Hutton, Bellgarth, Cunningham	5,790·44	317·661	Trecarne Renown 2nd
Palmridge's Florence	J. Sigley, Millaa Millaa	5,372·05	297·012	Oxford Jocular Lad

Junior, 2 Years (Standard, 230 lb.).

Lermont Madieraette	J. Schull, Lermont, Oakey	6,555·0	379·801	Woodside Golden Volunteer
†Fauvic White Bait	H. Cochrane, Fauvic, Kin Kin	6,326·1	319·724	Austral Park Sheik
Lermont Fairy Queen	P. H. Schull, Woodview, Oakey	5,877·7	319·299	Belgonia Lady's Duke 2nd
Trecarne Silver 5th	D. R. Hutton, Bellgarth, Cunningham	4,412·0	266·326	Trinity Some Officer
Trecarne Golden Dairymaid	T. Petherick, Lockyer	5,439·3	264·954	Jerseylea Golden Duke
Trecarne Peal 3rd	W. Griesheimer, junr., Leyburn	4,041·55	252·629	Jerseylea Golden Duke
Nairfall Marionette	J. Cummings, Upper Nerang	4,745·5	252·291	Nairfall Noble Basil
Carnation Peer's Fairy	D. R. Hutton, Bellgarth, Cunningham	4,304·28	241·744	Oxford Noble Peer
Nairfall Orange Lily	J. Cummings, Upper Nerang	4,514·05	240·61	Nairfall Noble Count
Trecarne Jersey Girl (244 days)	T. Petherick, Trecarne, Lockyer	4,838·6	240·240	Jerseylea Golden Duke
Lermont Melba	P. H. Schull, Woodview, Oakey	4,023·95	234·450	Lermont Major
Bellgarth Babette 4th	D. R. Hutton, Bellgarth, Cunningham	4,677·62	233·773	Trecarne Renown 2nd

* Ruby of Hawthorn (Australian Illawarra Shorthorn)—Please note amendment.

† Fauvic White Bait (Jersey)—Please note amendment.

General Notes

Staff Changes and Appointments.

Mr. C. V. Lilley (Lewis street, Camp Hill), has been appointed an Inspector under *The Diseases in Stock Acts, The Slaughtering Act,* and *The Dairy Produce Acts,* Department of Agriculture and Stock.

Mr. J. J. Purcell, inspector of stock, slaughterhouses, and dairies, Department of Agriculture and Stock, has been transferred from Chinchilla to Julia Creek.

Miss D. Mittelheuser and Mr. L. C. Kelso have been appointed assistant cane testers at the Babinda and South Johnstone sugar mills, respectively.

Mr. F. Caine, District Inspector of Stock, Cloncurry, has been appointed District Inspector of Stock, Brisbane.

Mr. J. Gunne, Inspector of Stock, Helidon, has been appointed District Inspector of Stock at Kingaroy, and Mr. S. J. Monaghan, Inspector of Stock, Boonah, has been appointed District Inspector of Stock, Cloncurry.

Mr. J. W. Garsden, clerk (Interviews), Bureau of Rural Development, has been seconded to the Chief Office of the Departmant of Agriculture and Stock for special duty.

The dates of appointment of the assistant cane testers to the Isis and Qunaba mills have been altered from 30th June to 30th July and from 28th July to 11th August, respectively, Mr. Anderson being the appointee at Isis and Mrs. M. E. Nally at Qunaba.

Mr. W. P. McGuire (Corbie, Curtis Island) has been appointed an honorary protector of fauna.

Constable I. R. C. Cooke (Kilkivan) has been appointed also an inspector under *The Slaughtering Act.*

The following have been appointed assistant cane testers for the present crushing season at the mills specified:—Messrs. L. E. Davies (Tully), J. Chalmers (Proserpine), J. V. Nowitski (Farleigh), L. V. Hoffman (Marian), C. A. Rehbein (Plane Creek), T. J. Donohue (Cattle Creek), B. G. Francis (Isis), and P. D. Crofton (Invicta); Misses P. O'Mara (Millaquin), J. Fisher (Inkerman), C. Jack (Kalamia), F. E. Noakes (Invicta), L. Oakes (Pioneer), E. J. Graham (Maryborough), T. H. Shield (Farleigh), C. Nielsen (Bingera), J. E. Ker (Marian), B. Thiele (Isis), and S. Crawford (Racecourse).

Miss M. Kleinschmidt (Beenleigh) has been appointed assistant cane tester during the current sugar season at the Pleystowe mill.

Mackay Quarantine Area.

A Proclamation has been issued under *The Sugar Experiment Stations Acts* declaring the Farleigh, Racecourse, Pleystowe, Marian, Cattle Creek, and North Eton mill areas to be a quarantine area under the abovementioned Acts in respect of the presence of downy mildew disease of sugar-cane. The nature of the quarantine to be imposed in the area shall be the prohibition of the removal of sugar-cane of any variety (except for the purpose of milling the same at the mill to which is assigned the plantation from which such sugar-cane is removed) from any plantation within the quarantine area which is downy mildew disease infested or has been so infested within three years of the time of such removal, unless the permission of the Minister has been granted for such removal.

Poultry Industry Regulations.

Regulations have been introduced under *The Diseases in Poultry Acts* to control the slaughter of poultry for sale for human consumption and the chilling of eggs. The regulations have for their object the supply of wholesome poultry meat and the protection of the quality of eggs that are submitted to the process of chilling.

The regulations governing the chilling of eggs further provide for the branding of such eggs.

The regulations governing the slaughter of poultry for human consumption will only apply in certain poultry districts which have been declared under the Acts. The poultry districts are Beenleigh, Brisbane, Caboolture, Coolangatta, Coomera, Cleveland, Fitzroy, Ipswich, Livingstone, Moreton, Nerang, Pine, Redcliffe, Rockhampton, Southport, Tingalpa, and Waterford.

Wheat Pool Election.

The State Wheat Pool Election Regulations, issued under *The Wheat Pool Acts*, have been amended to provide for optional preferential voting at future elections of growers' representatives on the State Wheat Board.

Banana Levy.

An Order in Council has been issued under *The Banana Industry Protection Acts*, providing for a levy on banana growers to be used for the maintenance of the Banana Industry Protection Board. The levy is similar to that issued last year, namely, 1½d. per case for bananas marketed in the case, and 2d. in the £ or part thereof for bananas marketed in the bunch.

Stallion Boards.

The following have been appointed members of stallion boards as hereunder specified:—

Darling Downs South Stallion Board.—Messrs. A. F. S. Ohman, M.V.Sc., Government Veterinary Surgeon, Department of Agriculture and Stock (chairman); J. H. Wall (Rockhampton), and T. MacDonald (Wooloowin).

Darling Downs North.—Messrs. R. D. Chester, B.V.Sc., Government Veterinary Surgeon, Department of Agriculture and Stock (chairman); J. L. Bowman (South Brisbane), and H. S. Handley (Pampas).

Central Coast.—Messrs. M. R. Irving, B.V.Sc., Government Veterinary Surgeon, Department of Agriculture and Stock (chairman); E. Cox (Paddington), and T. Turkington (Pilton).

Wide Bay and Burnett Boards.—Messrs. A. F. S. Ohman, M.V.Sc., Government Veterinary Surgeon (chairman); W. C. Jeffery (Miriam Vale), and T. MacDonald (Wooloowin).

West Moreton and East Moreton Boards.—Messrs. A. R. Nott, B.V.Sc. (chairman), and A. F. S. Ohman, M.V.Sc. (chairman), respectively, and D. Jackson (Teneriffe) and W. O. Scott (Taroom).

Canary Seed Slump.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock) has advised farmers to avoid canary seed as a cash crop for the coming season, as there is every indication of particularly low values ruling for this commodity for some considerable time. In recent years, he said, the area sown to canary seed had increased to an unwarranted extent, with the result that production had been in excess of market requirements. A complete collapse of the market had only been avoided by the action of the Government in guaranteeing the banking account of the Canary Seed Board. The Minister has appealed for the co-operation of Darling Downs farmers by refraining from producing unwanted canary seed, and so assist in preserving for themselves a valuable sideline industry.

Potash Shortage.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock) has announced the issue of an Order in Council under *The Agricultural Requirements Control and Conservation Act* further restricting the sale and use of potash for fertilizing purposes. This action was due, said the Minister, to the extreme difficulty experienced in importing supplies.

As previously prescribed, potash must still be sold in mixtures, but in the cultivation of tobacco the maximum percentage of potash is fixed at 6 per cent. for both sulphate and muriate. The quantity of muriate that may be present in any mixture is restricted, however, by fixing a maximum of 2 per cent. chlorine that may be present in any mixture.

For pineapples, the potash content may not exceed 10 per cent., and sulphate of potash, which is restricted to application during the second and third year of planting, may be obtained only by permit.

Cane farmers who were formerly obtaining up to 14.5 per cent. may now purchase mixtures containing a maximum of 10 per cent., and the 7.5 per cent. potash has been reduced to 6 per cent.

In fertilizer mixtures for vegetable crops, potatoes, citrus, deciduous fruits, papaws, custard apples, passion fruit, avocados, bananas, and strawberries, the maximum potash allowed is 6 per cent.

Potash may not be used on any crop other than those mentioned above.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

A Brachiaria Grass.

F.E.S. (Springsure)—

Your specimen was very interesting to us. It is a species of *Brachiaria*, but we have been unable to match it with any species in our native or exotic collections. We think the grass must be an introduction. Your note about its choking out mint weed is of great interest, as an allied grass, Urochloa or Liverseed Grass (*Urochloa panicoides*) has been found a most effective means of keeping mint weed in check on the Darling Downs.

Practically all the *Brachiarias* are excellent fodders, so that if any farmers or pastoralists feel inclined to gather seed from the patch in your district, they would be well advised to do so. Farmers have done this quite a lot with Urochloa seed on the Darling Downs, and this grass is now very widely spread. In the meantime, we should be very much indebted to you if you could send us an additional and larger specimen. Later on, if we can find out the specific name and the origin of the grass we shall let you know.

Wild Millet. A Love Grass.

B.H. (Dalby)—

Your specimen is not Urochloa grass, but is *Echinochloa colona*, commonly known as wild millet. This grass is very common as a weed of cultivation in Queensland, and one form occurs in rather wet, swampy country. It is generally regarded as an excellent fodder during the summer months, and is, in fact, closely allied to such well known cultivated fodders as Japanese millet and white panicum.

The smaller specimen is *Eragrostis poaeoides*, a species of love grass. This particular love grass generally occurs as a weed of cultivation, and is not regarded as of much value as a stock feed.

Log Wood.

D.McB. (Mackay)—

The specimen is the Log Wood (*Haematoxylon Campechianum*), a native of Mexico, but now found either cultivated or naturalised through the tropics. There are several trees of it in the Botanic Gardens, Brisbane. We have not heard before of the plant spreading in the way you describe, but think it is quite likely it would spread and become a pest, in the same way as *Acacia arabica* has, in some parts of North Queensland.

Carob Bean. Portuguese Elm.

B.S. (Kogan North, via Warra)—

The Carob Bean is a tree 20 to 30 feet high, with pinnate leaves. The flowers are mostly distinctly male or female, but sometimes hermaphrodite ones occur. They are small and insignificant. The pod is flattened, 3 to 4 inches long; the seeds are dark reddish brown, and are enclosed in a sweet sugary pulp. It is a native of the Mediterranean region, Southern Europe, Western Asia, and North Africa, but is now widely cultivated in most warm temperate countries. In past years the pods were largely imported into England as fodder for horses, and the best varieties were eaten as sweets or as substitutes. The Department has no seed on hand for distribution.

The Portuguese Elm is a spreading tree, deciduous for a very short period. The leaves are good fodder for stock. We think it would do well in your district. The crop is at present ripening on the trees at the Botanic Gardens, Brisbane, and we have put your name down on the list to receive a packet in about six or seven weeks' time.

Bundaberg District Specimens Named.

D.S., State School (Kolan North)—

1. *Dactyloctenium aegyptium*, Coast Button Grass. Native. Fair pasture grass.
2. *Axonopus compressus*, Broad-leaved Carpet Grass. Native of Southern United States. A fair pasture grass.
3. *Paspalum dilatatum*, Paspalum Grass. Native of South America. Very good pasture grass.
4. *Pennisetum clandestinum*, Kikuyu Grass. Native of Africa. Fodder valued comparatively high.
5. *Melinis minutiflora*, Molasses Grass. Native of Africa. Fairly high fodder value in tropics.
6. *Bothriochloa decipiens*, Pitted Blue Grass. Native. Fodder value low.
7. *Chloris Gayana*, Rhodes Grass. Native of Africa. Fodder value comparatively high.
8. *Eleusine indica*, Crowfoot Grass. Native of India. Occasionally eaten and only of medium value.
9. *Paspalum orbiculare*, Ditch Millet. Native. Fodder value slight.
10. *Themeda australis*, Kangaroo Grass. Native. Good fodder, particularly when young.
11. *Stenotaphrum secundatum*, Buffalo Grass. Native of South-Eastern United States of America. Fair pasture grass.
12. *Bothriochloa decipiens*, Pitted Blue Grass. See 6.
13. *Rhynchelytrum repens*, Red Natal Grass. Introduced from South Africa. Fodder value fair. Easily uprooted by grazing stock.
14. *Eragrostis leptostachya*, Paddock Love Grass. Native. Only of limited value as fodder; useful as constituent of mixed native pasture.
15. *Cenchrus australis*, Burr Grass. Native. Palatable only when young.
16. *Paspalidium* sp. Probably native. A fairly good fodder.
17. *Bothriochloa intermedia*, Forest Blue Grass. Native. Of limited fodder value.
18. *Paspalum paniculatum*, Russell River Grass. Native. Fodder value limited.
19. *Digitaria didactyla*, Blue Couch. Native of Mauritius. Good fodder grass, but quickly shows effects of drought.
20. *Cynodon Dactylon*, Common Couch. Native. Very good fodder grass.
21. *Sorghum verticilliflorum*, Wild Sorghum. Native of tropical Africa. A fairly good fodder grass.
22. *Heteropogon contortus*, Bunch Spear Grass. Native. Of fodder value only when very young.
23. *Echinochloa colona*, Wild Millet. Native of India. A very good fodder grass.
24. *Hyparrhenia filipendula*. Native. Fodder value very limited.
25. *Digitaria adscendens*. Summer Grass. Possibly native of tropical America, Fodder value fair to good.
26. *Chloris virgata*, Feather Top Rhodes Grass. Native of tropical America. Fodder value very limited.
27. *Brachiaria mutica*, Para Grass. Probably native of Africa. Good fodder grass.
28. *Axonopus affinis*, Carpet Grass. Native of Southern United States of America. Fodder value limited.

"Horse Radish Tree."

A.A.F. (Cloncurry)—

1. *Moringa oleifera*, Horse Radish Tree, a native of India. This plant is very widely used in India: the leaves as a substitute for horse radish, and the unripe pods as a green vegetable and substitute for asparagus. We think this is eaten freely enough by horses, but have not heard of its causing any trouble.
2. *Alysicarpus rugosus*, a native legume and one of the most valuable fodders of North-western Queensland. We have not heard a common name for it.

Sarsaparilla.

K.E.K. (Cooroy)—

The true Sarsaparilla is *Smilax medica*, a native of Mexico. It is a large vine with prickly stems, heart-shaped leaves, very small insignificant flowers, and red berries. The plant you describe is a totally different one, and in no way related to the true Sarsaparilla. It is *Hardenbergia monophylla*. The roots have a sweetish taste, and have been used as a substitute for Sarsaparilla in the manufacture of beverages.

We have in Australia several species of *Smilax*, one of which, *Smilax glyciphylla*, is common both in Queensland and New South Wales. This plant is frequently collected as a source of sarsaparilla, and is largely used in New South Wales in the manufacture of soft drinks and cordials. We have the same species here, but it seems to lack the sarsaparilla taste.

VETERINARY ADVICE.

(*Selections from the outgoing mail from the office of the Director of Veterinary Services.*)

Cattle Tick Control.

C.W.G. (Gladstone)—

1. Can ticks attached for fourteen days be killed in any arsenical dip?

Answer.—Ticks of this age are readily killed by dipping in an arsenical dip. It was at one time considered that nymphal ticks at the time when they were moulting to the adult stage (14-16 days old) were resistant to dipping because they were protected by the cast off nymphal skin, but this has since been disproved. Eradication campaigns always use 14-day intervals between dippings. The results in the United States show how effective such an interval can be.

2. Will arsenical dips kill all stages of ticks?

Answer.—No arsenical dip of the usual strength (0.2 per cent. arsenic) is 100 per cent. effective. A few ticks of all stages may escape. Adult female ticks which are fully engorged (19-35 days old but usually 24 days old) or which are 3-4 days off full engorgement are, however, considered to be more resistant to dipping than other stages.

3. Is it a fair test of the efficiency of a dip to remove ticks 10-15 minutes after dipping, place them in a match box and see how long they live and whether they will lay eggs?

Answer.—Yes, and such a test is always used by us when testing a dip, except that we consider that only the larger semi-engorged to engorged female ticks should be used. Nymphs and young adult females, even when undipped, will die in a few days after removal from cattle. Tests of the effect of a dip upon ticks involves placing these dipped females under favourable conditions—they are very susceptible to lack of moisture—and seeing how long they live, how many eggs they lay, and whether these eggs hatch, and whether the larval ticks that hatch from the eggs are strong and active. Dipped females frequently lay eggs which do not hatch. In such an instance, the dip is considered efficient.

As regards the large ticks still showing life after 5 or 6 days, it is possible that some of these have been so affected as to lay eggs which do not hatch. Others, of course (see answer to Question 2), may be only slightly affected and will lay quite normal eggs.

4. How is the tick killed?

Answer.—This is a very controversial point. Some observers believe that death occurs through absorption of arsenic through the tick's skin. Others believe that the tick sucks in arsenic from the animal's skin into which the arsenic is absorbed after dipping.

5. Intervals between dipping for tick control?

Answer.—For purposes of control one should dip cattle at such intervals that the larvae picked up between dippings are not permitted to remain long enough on the animals to become fully engorged females and then drop off and lay eggs. The minimum period recorded for cattle tick larvae to reach this stage is 19 days. In practice for eradication work, 14-day intervals are used. If periods longer than 19 days are used, many ticks will be dropped off and laid eggs in between dippings. This would, of course, tend to prevent complete control.

Rural Topics

Saving Our Soil.

It is remarkable how interest in soil erosion, or, rather the means of preventing loss of farm fertility, is spreading throughout Australia and we seem to be becoming more soil-minded every day—it may be that our "soiled" conscience is biting us! Still, it is no use continually harping on the causes of soil erosion, and we have simply got to give more thought to the remedies—the practicable remedies within reach. Yet there is no one remedy, or combination of remedies, suitable for working on in every district. What may be good round about Kingaroy would not, perhaps, do the job so well in the country below the Range or along the North Coast, or in the heavy rainfall regions up above Townsville. There are, however, fundamental principles of soil conservation that do apply over a wide diversity of conditions. For instance, we are thinking more about the wider use of close-growing grasses and legumes like lucerne which are proving effective soil savers over many different classes of country. World experience shows, generally, that most soils must have the benefit periodically of close-growing grasses to maintain fertility and structure.

Many of our ideas are now being applied in general practice—such as the use of grasses and legumes, improved crop rotations and so forth—but what is needed most of all is to get away from "square farming in a round country." That means contour cultivation and, where soundly practicable, strip-cropping; under this system each furrow acts as a dam to any serious run-off during every shower of rain. But, perhaps, most important is the fact that under this new practice, the right crop is grown in the right place. In other words, cultivation conforms to the lay of the land.

Wind and water, of course, respect no boundary fence and adequate soil conservation in any district can only follow whole-hearted understanding and backing of all the people concerned. And apart from this neighbourly co-operation in the prevention of soil erosion, safeguards can be established more economically through farmers working together.

Beauty Bosses the Beast.

Here is a good story from England, where the Women's Land Army are doing excellent work in country districts: At a dairy farm where land girls were training, milking was naturally part of the ordinary daily course. After awhile they passed out to farm employment and the men (over military age) came back to the cow bails. In a few days the cows seemed to be animals with a settled grievance; they were holding back their milk; the men could do nothing with them; the milk yield was dropping, and the dairy farmer was wondering what it was all about.

His wife, however, put things right. At her suggestion the men sprinkled a little scent in their overalls; they trimmed and painted their finger nails and made up their lips and faces. Result (believe it not): Milking became a joy and yields rose up a gallon a day!

New Uses for a Vacuum Cleaner.

In the countryman's session (the Australian Broadcasting Commission, Regional Radio Stations) recently, Dr. Montgomery White, agricultural chemist, who also is an authority on animal nutrition, said something about getting show animals ready for exhibition. He expressed the opinion that hosing of animals under strong water pressure is not always an advantage. The experience is often new to the animals, and a strong-pressure hose turned on them might actually stop them from settling down in their strange surroundings at the showground. Of course, most stockmen have their own ideas on the preparation of a show coat on a beast. Much depends on the season—that is, how the winter coat is shed, the country, how the animals have travelled, and so on. Coal dust or grit, for instance, is not easy to get out from a very mossy-coated animal, and days of shampooing, combing, and beauty-parlour treatment are necessary. Dr. White suggested that an ordinary vacuum cleaner would be very handy at the showground to run over the coat of a beast, the same way as it is run over a carpet. Several show cattle men have written commending Dr. White's idea, and this is what one stud breeder says: "I think your idea of a vacuum cleaner for show stock is top-hole. As a matter of fact, I use one for defleaing my dog."

That way of defleaing a dog is a bright idea, and might commend itself to any Digger who has had the experience of many hours "reading his shirt!"

Man's Trinity of Responsibilities.

Without flippancy and with all reverence, it is suggested in a recent issue of *Citriculture* (California) that if Moses had foreseen man's woeful misuse of land in every country and in every age—the wastage of soil by man's suicidal agriculture and the resulting man-made deserts and ruined civilisations—if he had foreseen the desolation caused by man's ignorance or greed or both, Moses, no doubt, would have been inspired to amplify the Ten Commandments to ensure man's understanding and observance of his trinity of responsibilities—his responsibility to his Creator, his responsibility to his fellow-men, and his responsibility to Mother Earth. Such an amplification might have been given in these words—

> "Thou shalt inherit the earth as a faithful steward, conserving its resources and fertility from generation to generation. Thou shalt safeguard thy fields from soil erosion, the living waters from drying up, thy forests from desolation, and protect thy country from overstocking or overgrazing, so that thy descendants shall never be deprived of their abundance."

Lucerne for Grazing Land.

Down in the southern States the practice of sowing lucerne in grazing paddocks is arousing widespread interest. In suitable soils and under a rainfall as low as 14 inches, lucerne sown in pasture has exceeded all expectations in parts of the eastern Riverina country. Although winter rains are the rule down there, occasional summer falls have even provided a cutting for hay as well as a constant nibble for stock throughout the summer. Of course, local conditions have to be right. Lucerne, of course, should have a suitable seedbed and it must get a good start. So, before doing anything on a large scale or going to any considerable expense, anyone who is inclined to give lucerne a trial on the same lines followed, with some success, by graziers in the South would naturally make a test sowing at no appreciable cost. If the trial fails, one is not much out of pocket, and if it succeeds, well, a lot of useful information has been gained. With lucerne, we know that with a fairly good strike followed by favourable spring weather, it is possible to get something like a good stand, except, of course, on shallow, clayey soils. Two pounds of seed to the acre is recommended for grazing purposes. In the Mallee country in Victoria it has been found quite practicable to establish lucerne under cover of a light seeding of wheat. Once lucerne is established, it is well known that it must be given fair treatment if it is to give good results. We have all seen many a good grass and much useful herbage eaten right out in dry times, because of overstocking for too long a period.

Blowfly Strike Control.

And while on wool, it is good to know that a Commonwealth-wide campaign for blowfly strike control has been planned on lines that should lead to a good win in the fight against the worst of our pastoral pests. By new methods, it is anticipated that the incidence of blowfly strike can be reduced by as much as 80 per cent. What is known as the Joint Blowfly Committee, which is working under the direction of the Council for Scientific and Industrial Research and the various veterinary services, has been testing out the value of methods such as jetting, correct lamb-marking, breeding plain-rumped sheep, and so on. Although some definite conclusions have been arrived at, there remains the difficulty of carrying them very far beyond the experimental stage. To bridge the gap between the work of the science man and its application by the practical man, schools of instruction for agricultural extension officers are about to be started in the South. At the end of the instructional term, the extension men will carry on with a campaign of demonstration, so that flockowners will be able to see methods of checking blowfly strike in their sheep in actual application. Personal contacts and showing just how a job should be done make up the best form of publicity in these matters.

A New Kind of Scarecrow.

On a farm in Kent (England) dressmakers' models are being used as scarecrows. The farmer bought them at a low price at a blitz salvage sale, and he says they do their job of scaring birds from growing crops, especially in the cabbage fields, wonderfully well.

From what we can remember of old-fashioned dressmakers' dummies they'd scare anything, whether bird or beast, out of a paddock. It would be interesting, however, to know how one of the beautiful life-size models so conspicuous in drapers' show windows nowadays would act as a scarecrow! The very reverse, probably, for a crow or any other "bird" would certainly be attracted by their grace and beauty!

Papaws and Wool.

Whoever would have associated papaw growing with the pastoral industry, but there it is. While we all deplore war, the fact is that it forces us to set our wits to work in all sorts of ways. The tremendous demand for unshrinkable wool for clothing for our fighting men has started studies of every possible or practicable process that would lead to stopping shrinkage in woollen goods. A lifeline for the wool industry after the war may be provided, we are told, by two remarkable developments—an anti-shrinkage process, and the taking of the "tickle" out of woollens. Both these things have been done with an extract from the Queensland papaw. It is believed that when military requirements cease to be our first consideration, these developments will tremendously strengthen the position of wool in the textile world.

The anti-shrinkage process is regarded as of special importance to pastoralists with merino flocks, because it not only permits woollens to be washed like cotton garments, but gives finer wool a greater range of usefulness. The process is developing amazingly in army clothing manufacture, and so will be ready for immediate application to normal trade purposes when the war is over. Every week 500,000 pairs of socks for the Services are being treated at a cost of only a penny a pair. The process, which is called the enzyme process, gives a silkiness and softness to woollens which has never been known before, and great things are expected from it when peace returns.

Incidentally, it provides a very interesting example of the interlinking of one primary industry with another—pastoral and horticulture. Papaws are certainly appreciated by the "inner man" and now by the "outer man" as well. Still, no one has ever thought before of associating a papaw with a "Jacky Howe," or, say, fruit salad with a flannel shirt.

Sunflower Oil.

Oil extracted from a sunflower crop grown in the Warren district of New South Wales is said to be more valuable than the best imported Italian olive oil. Trial plots of sunflowers sown with several varieties have produced very satisfactory results. One crop under irrigation had flowers as large as 12 inches in diameter. Besides watering, the ground had been ploughed deeply several times and treated fairly heavily with superphosphate.

For the sunflower, it is said, that after the oil is extracted from the seed the residue can be used as stock feed, and the fibre of the plant itself is suitable for making strawboard.

It is well known that sunflower seed is very fattening, so it would be wise to keep it away from laying hens.

The sunflower is a heavy feeder, so it would be necessary to plant it only as a rotational crop to give the soil time to recover from the heavy drain it makes on it.

A Novel Plough Attachment.

An original mouldboard plough attachment, which combines a disc and rolling coulter and fixes to a plough by a special arm, has been recently introduced in the United States. The attachment cuts all heavy trash and assists the plough in working it under. The manufacturers claim that this new attachment makes for high-speed ploughing without the help of extra labour and without the loss of time entailed in cleaning a plough which otherwise clogs from time to time.

Experience Teaches.

The opportunities now open to the youth of Australia of obtaining some insight into the underlying principles of agriculture, enabling them to make more and better use of experience, is bound to have its effects on the coming generation of farmers who will not only be anxious to adopt new methods with new ideas, but will realise the importance of business principles in farming.

What We Owe to Posterity.

Here is something we can all paste in our hats:—There is a debt to posterity which is owed by every owner of agricultural land. On him rests the responsibility of leaving to his successors his land in as good condition as it was when he turned his first furrow—even in a better condition, if possible. Anyone who does not do everything in his power to prevent his soil from washing away or losing fertility can hardly expect to be held in happy remembrance by those who have the misfortune to follow on in the cultivation of a misused and worn-out farm.

Farm Notes

SEPTEMBER.

With the coming of warmer weather, weeds of all kinds will be making their appearance on cultivated land and among row crops, but in the latter case they can be effectively dealt with by inter-row cultivation, and, where necessary, by the use of the hoe.

Where crops are sown on thoroughly fallowed land, the greater freedom from weed infestation is at once apparent when compared with adjacent paddocks which have merely received a hurried preparation, so that sowing clean seed on clean land may be amply rewarded in the resultant clean crops and higher returns.

Potatoes planted during July and August should now be making growth, and should be sprayed with Bordeaux mixture as a preventive of blight, particularly if cool, moist weather is experienced. Bordeaux and Burgundy mixtures are not regarded as a cure for blight, but the spray forms a satisfactory protective covering, which, if applied at intervals during growth, will effectively prevent the disease. Where land has received adequate preparation, forming a satisfactory seed-bed, and has a sufficiency of subsurface moisture to induce germination, early sowings of maize, sorghum, sudan grass, millets, cowpeas, and pumpkins and the planting of sweet potato cuttings may be proceeded with, the farmer's chief concern being to provide a sufficiency of summer-growing fodder and grain crops both for current needs and for storage as seasonal reserves.

The spring maize crop is usually considered as uncertain for grain production, as the warm, moist conditions required during the tasselling period do not always occur, but as excellent crops are sometimes obtained the risk is well worth while, especially as the fodder provided can always be put to good use in the event of a failure for grain.

Early-maturing Yellow Dent varieties—such as Funk's 90-Day and Early Leaming—will be found the best for early sowing, as they have the capacity of making the best use of available moisture.

During this month attention should be given to first sowings of quick maturing forage crops, such as panicum and millets and Sudan grass, to meet the need for green feed urgently required following a winter period.

Market prices also are a consideration, for although early sown maize is usually intended for farm use, any surplus can be disposed of at higher prices than may be obtainable for the main crop at a later date.

Sweet potato cuttings will now be obtainable, and attention is directed to this valuable crop, which will thrive over a much greater range of climatic and soil conditions than the English potato. There is scarcely a farm throughout the State which would not benefit from a patch of sweet potatoes, for either culinary use or stock-feeding. They are not always profitable as a market consideration, but improvement in this direction is possible if well-graded tubers of suitable cooking varieties only are offered.

AUSTRALIAN REAPERS FOR THE BRITISH HARVEST.

Here is an interesting item of news from Britain, and it shows that Australia is not only contributing strongly and effectively to the defence of the British Commonwealth, but also the production of food in the Old Country. Australian reapers and binders are now being delivered in Britain to assist in harvesting Britain's greatest crop of the twentieth century.

More than 4,000,000 acres have been added to cultivated land in the last two years, requiring 100,000 tractors and an immense amount of new machinery which is arriving from Australia, Canada, and the United States. Schoolboys and university students, as well as men and women, will lend a hand in gathering the abundant crops.

Orchard Notes

SEPTEMBER.

THE COASTAL DISTRICTS.

In the North Coast and Gayndah districts most of the citrus crops have been harvested, with, perhaps, the exception of Valencia Lates. Orchard work this month includes pruning, cultivation, fertilizing, and spraying. Some trees may be showing signs of impaired vigour, and these will require a severe pruning, both in thinning and shortening back, removing superfluous growths and diseased and weakly woods. Healthy and vigorous orange trees will require little attention beyond the removal of crowded lateral growths.

Mandarins will need special treatment, particularly Glen Retreats and Scarlets. These varieties usually produce a profusion of branches, and as the trees mature the growths harden and the fruit-bearing shoots make short, weakly growths, which usually result in an over-production of small fruits and a weakening of the trees. This is noticeable particularly in the case of the former variety, for which the annual pruning should consist of a heavy thinning and shortening back. Mature mandarin trees require attention towards assisting them to produce new and vigorous fruit-bearing growths.

Unprofitable trees should receive attention and be prepared for top-working. They may be headed back to three or four main arms radiating from the stem and whitewashed to prevent bark scald. Such trees may be grafted or later budded when suitable growths have matured.

Before working up the soil, fertilizing should receive attention. The spring application should carry a high percentage of nitrogen.

In the warmer districts, which are free from frosts, plantings of young trees may be made. Serious consideration should be given only to the selection of commercial varieties and, having due regard for local conditions, selections may be made from the following varieties:—Washington Navel, Joppa, Valencia Late, Beauty of Glen Retreat, Emperor, Beauty of Ellendale (irrigation areas), Marsh Seedless or Thompson grapefruit, and Villa Franca, Lisbon, Eureka, and Genoa lemons.

Where melanose and black spot are present in orchards, preparations for control measures should be made and Bordeaux sprays applied at the correct times.

Most citrus trees would benefit considerably by the application of a strong lime-sulphur wash, 1-18.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

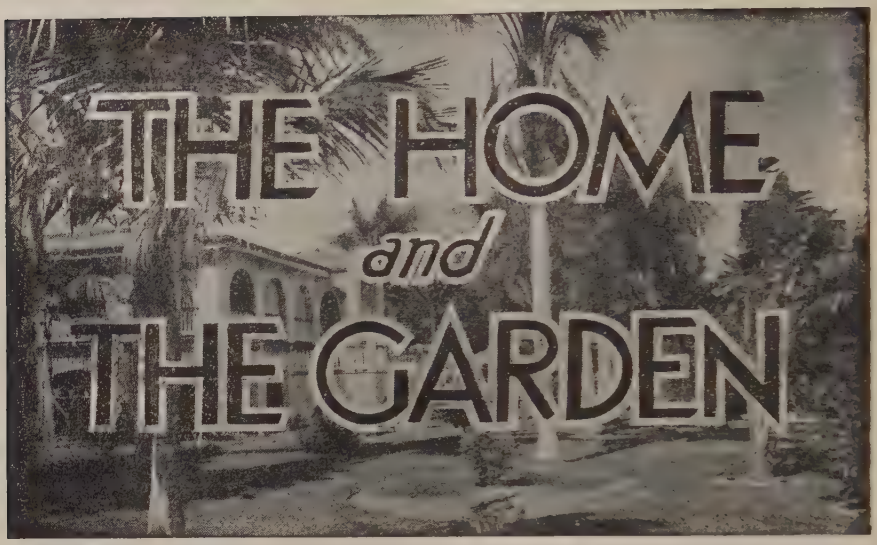
Black aphis should be attacked wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty. If these very destructive insects are kept well under control, the young growth of flowers, leaves, wood, and fruit will have a chance to develop.

The working-over of undesirable varieties of fruit trees may be continued. The pruning of grape vines should be done during this month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance there is of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture, but also act as a harbourage for many serious pests, such as the Rutherglen bug.

New vineyards may be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer localities suitable for the growth of citrus fruits, the land should be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

Fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this swarm of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH: NATION'S WEALTH.

COLD WEATHER AND THE BABY.

"HERE we go round the mulberry bush on a cold and frosty morning." Who does not remember that old nursery rhyme with its picture of happy, healthy children playing active games in the cold, keen air of an English winter? And could there be a more sensible way of keeping warm on a cold day? In Queensland we do not have very many "cold and frosty mornings," although on the Downs and over the western plains the cold can be severe while it lasts, and even on the coast we have some cold, grey days. Generally speaking, however, the winter season in Queensland is short, and although the early mornings and nights may be cold the days are usually warm and sunny. The westerly winds make most of us feel uncomfortable, but they do not continue for long.

Nevertheless, even in our short period of cold weather, babies and children do need special care, and it is well that we should consider what that care implies. We must remember at the same time that to hardy, active people of any age, cold is invigorating. Only to those who are sick, weakly, or coddled is cold weather likely to become a source of harm.

Feeling the Cold.

Like the grown-ups, children differ from one another and some feel the cold more than others. These should be treated accordingly, whilst at the same time everything possible should be done to tone them up and improve their circulation and general health.

Children suffering from lack of warmth will be miserable, fretful, and listless. They tend to sit about huddled up much as our pet cats and dogs lie curled up in order to conserve the natural warmth of their bodies.

The Skin.

Most people know that the skin of our bodies is a protection against injury, but few realise that it also plays a vitally important part in regulating heat. We all know that if we do not use our muscles they become soft and toneless; in the

same way the skin, if not exercised and developed, is unable to take its share in building up the power of the body to withstand changes of temperature. If a child is over-clothed and consequently this function of the skin becomes impaired, the movements of the body are impeded, and he feels every change of temperature and suffers in consequence.

Clothing.

The intelligent mother is careful to clothe baby in accordance with the changes of temperature that occur, not only from day to day, but from one part of a day to another. When the young child wakes early on cold mornings and wants to sit up in bed and play, it is a wise plan to remove any wet garments and put on dry ones covered by a warm gown or jacket.

When the sun rises and the morning becomes warmer he will usually be comfortable and happy on a rug or old blanket in his play pen, or in a sunny corner of the veranda which has been enclosed for him.

In choosing baby clothing for cold days, we must remember that although knitted garments are best and warmest in still air, they are not sufficient protection in windy weather, and one thickness of closely woven material, such as flannel or silk, is necessary when baby is outdoors on windy days.

The baby who has reached the crawling stage may be a problem in cold weather, as his feet, legs, and hands may become badly chilled as he crawls around among all the draughts on the cool linoleum. He requires a suit of closely woven or knitted woollies covering feet and thighs. Mothers can easily make good crawling suits for baby by using the tops of old woollen stockings, old woollen bloomers, and jumpers. Do not make the mistake of keeping him in his cot all the time just because the weather is cold. The exercise of crawling will warm him up, provided he is suitably clad.

During the warm hours in the middle of the day remove unnecessary woollies, but as the day wanes be ready with extra wraps.

This attention and watchfulness is common sense—not coddling; but it should be carried out quietly and naturally, taking care not to fuss over the child or make him feel that you are anxious about him. For the one casual mother who carelessly allows her baby to become chilled by unsuitable or insufficient clothing, there are many others who, by remarks such as, "Billy, put your jersey on at once or you will get your death of cold," and by incessant fussing over a little chilling or wetting, are doing their best to create the neurotic individual we have all met who visualises an attack of rheumatic fever or pneumonia every time he gets a wetting or forgets his overcoat on a cold day.

Remember that busy and active children whose skins are "doing their job" will not feel the cold like their parents, whose movements may be slower and their occupations less energetic. It is quite easy to tell by his appearance and general behaviour when a child is cold, and there is no need to fuss over him.

Ventilation and Sunlight.

Even in Queensland, with its equable climate, we sometimes find babies and children in rooms that are poorly lit and badly ventilated. Winter is the time when we can use our lovely sunshine to the full, because there is so little danger of burning, and real sun baths can be given to baby, provided a suitably sheltered spot is chosen. Verandas are particularly useful, and when situated on the sunny side and protected from winds they provide excellent sleep-outs for babies and children even on the coldest days. If you must keep baby in a room, see that it is well ventilated and sunny. To ventilate a room properly it is necessary to have a moving current of air, say, between two windows or a window and a door. Baby's bed can be placed out of the direct draught.

Winter colds are not caused by cold air but by being shut up in badly ventilated rooms, particularly when people are present who have colds or are carrying in their throats and noses the germs of other diseases.

Ventilation provides us with a means of dividing up or diluting germs that may be present in the air. If these germs are sufficiently diluted with pure, fresh air they become harmless. Remember, colds and whooping cough and measles are not caused by chilling, but by germs which are sprayed into the atmosphere by the coughing or sneezing of infected persons. Keep your windows open and drive them away.

Babies and young children should not be taken into crowded buildings or kept out so late that they have to travel in crowded trams or buses with the windows shut. Also, they should be kept away from children suffering from colds and other infections.

Exercise.

As we explained in our nursery rhyme at the beginning of this talk, the natural way of warming the body is by exercise. Let the children play out of doors and go for walks on the cold days. Even wet weather does not harm them if they change clothes and shoes when they come in. Do not send children out without hats, particularly in windy weather, and the panties of both girls and boys should be of woven material and reach almost to the knees, so that the thighs are warm.

Diet.

Mothers often ask whether they can give their children anything that will prevent them "taking cold," and we always answer that the best protection against any disease is an all-round good diet. The young baby is fortunate in having provided for him by Nature his mother's milk, which is his best protection against disease. The older child who gets plenty of fresh air and sunshine and eats every day a good quantity of the "protective" foods—milk, butter, eggs, vegetables, fruit, and wholegrain porridges and breads—should have a very good resistance to colds and other infections.

If a child is weakly or seems to take cold easily, cod-liver oil in some form may be given during the cold weather in addition to the foods mentioned.

You can obtain further advice on this or any other matter relating to the feeding and management of children up to school age by writing to "Baby Clinic, Brisbane." Such letters need not be stamped.

IN THE FARM KITCHEN.

POPULAR DINNER DISHES.

Baked Cabbage.

Shred a fairly large cabbage finely and soak in cold salted water until crisp. Drain well and put in a large saucepan with a tablespoon butter, pepper, and salt to taste. Cover well with a tight-fitting lid and cook until tender. Stir now and again during the cooking to prevent burning. Allow to cool, then add 2 well-beaten eggs, 1 tablespoon shredded and fried bacon, a little grated nutmeg. Well grease an ovenproof dish or basin and sprinkle thickly with brown breadcrumbs. Fill centre with the cabbage and cover with more breadcrumbs. Bake in a hot oven for half an hour, turn out and serve with brown sauce or as a vegetable to serve with roast meat.

Baked Apple Roll.

Sift ½ lb. plain flour with a good pinch salt. Make a bay in the centre, add the yolk of 1 egg and 1 whole egg and enough warm water or milk to form into a smooth dough (about one-third cup). Add 1 oz. melted butter and beat dough until smooth and until it does not stick to the hands. Place dough on a clean floured tea towel, cover with a basin, and allow to stand in a warm place for half an hour. In the meantime peel, core, and slice 6 or 7 large apples, put in a basin, and sprinkle with sugar, add 1 tablespoon brandy, mix well together, and cover until required. Melt 3 tablespoons butter or good margarine in a saucepan, add 4 oz. fine white breadcrumbs, and fry until lightly browned. Wash and dry 6 oz. sultanas. Roll dough into an oblong piece about 12 inches by 18, rolling it as thin as possible. Sprinkle the cloth with a little more flour, place the rolled dough on this and pull the paste from side to side until it is almost transparent. If any thick patches of dough remain, pass the hand underneath and work gently until thin without breaking the dough. The dough should be about 2 feet by 3 feet. Distribute the thinly-sliced apple all over the dough, then sultanas, a little melted butter, then a little sugar and ground cinnamon; rub about 4 tablespoons apricot jam through a sieve and add 1 tablespoon boiling water. Add to this apple, &c., and spread it as evenly as possible. To roll the dough, hold the cloth from one side and raise both ends gently so that the dough, &c., will roll itself into a thick roll. Place on a greased baking dish, brush over with melted butter, and bake in a moderate oven for about 45 minutes.

Wheatmeal Custard Tart.

Cream 3 oz. butter and 3 oz. sugar together until light and fluffy. Gradually add 1 tablespoon water to which is added a few drops egg-yolk colour. Sift 6 oz. plain flour with ¼ teaspoon baking powder, a pinch salt, then add 2 oz. fine wheatmeal. Roll out and line a sandwich tin about 6 inches in diameter. Beat 1 large egg slightly, add 1 dessertspoon sugar, vanilla, and 1 cup milk; bake in a moderate oven until custard is set and pastry brown.

Baked Rhubarb Pudding.

Stew 1 bunch rhubarb in the usual way, using as little water as possible. Remove the crust from stale white bread and weigh 1 lb. Cover this with just enough milk and when quite soft squeeze out until almost dry. Mix this with 2 oz. finely-grated suet, 2 oz. sugar, and 1 beaten egg. Line a well-greased round cake tin with this mixture, reserving enough for top. Fill with rhubarb, then cover with the remaining bread mixture. Bake in a moderate oven for 1½ hours. Turn out carefully and serve hot.

Curry and Rice.

Cut up cold meat into dice and springle over 1 tablespoon curry powder to each 1 lb. cold meat. Melt 1 tablespoon good dripping in a pan and fry meat until a golden brown, or, if liked, a dark brown. Peel and slice 1 lb. onions and ½ lb. chopped apples and fry them also. Add to meat and enough stock to cover. Simmer for 2½ hours. Skim well and add lemon juice and 2 sliced bananas and simmer for 6 or 7 minutes. Dish up in a border of well-boiled rice.

IN THE FARM GARDEN.

A CHEAP FERTILIZER.

The garden compost heap is a cheap means of converting garden and household vegetable refuse into valuable fertilizing material. Materials such as lawn clippings, spent crops free of disease, and vegetable tops should be used in this way, but the coarse, woody stalks of strong-growing plants should be avoided.

The production of artificial manure from garden waste, straw, &c., depends on the decomposition, by fungi and bacteria, of much of the plant material. The rapidity with which the process goes on is influenced by the type of material, its degree of maturity and chemical composition, and by the presence of nutrients, such as lime, phosphate, nitrogen, and potash for the organisms carrying on the decomposition are much akin to plants in their requirements.

Actual damage can be done to crops, other than some legumes, by the addition of uncomposted, poor-quality material to the soil. Such materials as bush scrappings, dry mature grass or straw, offer a good source of energy for the soil bacteria and fungi which rapidly increase in numbers, and in so doing consume some of the available nitrogen. This competition between the plant and the soil organisms for soil nitrates may result in the nitrogen starvation of crops.

The usual process of allowing plant refuse to decay, without any chemical treatment, results in a very acid product. With plant residues containing little nitrogen and phosphate, it is necessary to add available nitrogen to the heap as well as lime (which prevents the development of acidity) and phosphate (which is required in the nutrition of the organisms). With materials rich in nitrogen and minerals, such as legumes (peas, beans, &c.), green vegetable tops, and other green succulent material the use of lime alone should be sufficient to ensure rapid decomposition.

With general refuse or poor-quality material, a heap can be made on a square base and of such size that the final height is about 3 feet. The chopped-up material should be spread in layers several inches deep, each layer being treated in the following way:—

Snow over with ground limestone (5 lb. per 100 lb. of material), fork in loosely, give a sprinkling of superphosphate, and then add sulphate of ammonia at the rate of 1½ lb. per 100 lb. material. The material should be moistened before building up the layers, if not already moist. Ammonia will be given off slowly, so that it is necessary to keep building up and treating the successive layers quickly, in order that the loss will be kept at a minimum. The final layer is not treated, and may be given a covering of an inch of soil. When next the heap is added to, the untreated layer can be moistened and treated.

When the heap is at its full height, after subsidence due to compaction and bacterial action, the untreated capping can be used as a base for the next heap. The heap should be kept damp, but the amount of water used should not cause draining from the heap.

In summer the material should be ready for use after two months, but in cold weather the process is much slower.

Properly prepared, compost manure is very similar in chemical composition to horse manure, and gives equally good results in promoting plant growth.

ASTRONOMICAL DATA FOR QUEENSLAND

SEPTEMBER, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

Sept.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	p.m.	a.m.
1	6.6	5.38	1.22	2.14
2	6.5	5.39	2.21	3.8
3	6.4	5.39	3.19	3.57
4	6.3	5.40	4.17	4.43
5	6.2	5.40	5.13	5.25
6	6.0	5.40	6.9	6.4
7	5.59	5.41	7.3	6.42
8	5.58	5.41	7.55	7.18
9	5.57	5.42	8.48	7.53
10	5.56	5.43	9.39	8.30
11	5.55	5.43	10.30	9.8
12	5.54	5.44	11.21	9.47
13	5.53	5.44	nil	10.30
			a.m.	
14	5.52	5.45	12.11	11.14
				p.m.
15	5.51	5.45	1.1	12.3
16	5.50	5.45	1.49	12.54
17	5.48	5.45	2.37	1.49
18	5.47	5.46	3.23	2.47
19	5.45	5.46	4.7	3.46
20	5.44	5.47	4.51	4.48
21	5.43	5.47	5.34	5.51
22	5.42	5.48	6.16	6.54
23	5.41	5.49	7.0	7.59
24	5.39	5.50	7.47	9.4
25	5.38	5.50	8.36	10.8
26	5.37	5.50	9.28	11.11
27	5.36	5.51	10.22	nil
				a.m.
28	5.35	5.51	11.18	12.10
			p.m.	
29	5.34	5.52	12.16	1.5
30	5.33	5.52	1·14	1.56

Phases of the Moon.

6 September, Full Moon, 3.36 a.m.
14 ,, Last Quarter, 5.31 a.m.
21 ,, New Moon, 2.38 p.m.
28 ,, First Quarter, 6.9 a.m.

ECLIPSES THIS MONTH.

THE sunburnt planet, Mercury, was beyond the sun about the middle of last month. It has now passed into the evening sky, setting, in the twilight, about 6.30 o'clock. If Mercury can be seen on 5th September it will serve as a directing post on the way to Neptune, which is far beyond, well out of sight, some 167 million miles. Mercury will be seen higher in the sky each evening all this month. Towards the end of September the planet will shine quite brightly, like a second Evening Star. On 22nd September Mercury will be passing close to Spica, the bright white star in Virgo. With the brilliant Evening Star, Venus, and the slender crescent moon nearby, a very pleasing picture will be presented. Two days later the young moon will be near the brilliant Venus. This may give rise to some old sailor-men saying, "There's a bright star doggin' the moon and there'll be bad weather." Bad weather predicting would be easy if this always held true.

PARTIAL LUNAR ECLIPSE.

In the early morning of 6th September a partial eclipse of the moon will occur. It will be full moon, of course, and the moon will be up all night. About 3.19 o'clock the edge of the moon will touch the dark shadow thrown out into space by the earth. For the next 28 minutes the moon will pass deeper into the shade, until a dark bite appears in the edge of the disc. Then the moon will gradually pass out again, until by quarter past four o'clock the bright lunar disc will be clear of the earth's tarnishing shade, allowing our wonderful old moon to again take up her ancient role of "Parish Lanthorn."

The Red Planet Mars is now very conspicuous in the evening sky. It rises soon after 8 o'clock and reaches the meridian about quarter to three. It is in the constellation of Aries, the Ram, and will be not far from the moon on 9th September. Those who have watched the movements of Mars with respect to the "fixed stars" have noted that it has been moving eastward. Its eastward bound voyage is now slowing down and by 6th September Mars will stop and begin to move back along the way it has come, until November, when it will stop again and once more head eastward.

On 11th September Saturn will appear to stop and then move back for several months the way it has come. Saturn will soon be an evening star, for now it rises a half-hour after mid-night, near the Pleiades. Jupiter rises 36 minutes later, north of Orion. With these two great planets, the region of Orion, the Dog stars, the Pleiades and Hyades, is the most brilliantly starlit region of the whole heavens.

ECLIPSE OF THE SUN AT CAPE YORK.

On 21st September, along a narrow path from near the Black Sea across Asia to Formosa, on the China coast, and half way across the Pacific, a total solar eclipse will be seen by millions of people. This most amazing spectacle will only be seen for a little over three minutes, at the most. On either side of the path of totality, there will be a partial eclipse, growing progressively smaller from the central line. The limits of the partial phase will extend from the North Pole to near Townsville and from the Red Sea to mid-Pacific. Those living in Cape York north from Townsville to the southern shores of the Gulf and across Arnhem Land, may see a slight partial eclipse. Near the southern limit it will begin about 4 o'clock in the afternoon. Farther north it will begin earlier.

Spring comes to the southern hemisphere on 23rd September, when Old Sol reaches the equator on his way south to bring us the summer. During his sojourn north of the equator our nights have been longer than the days but after this date, while the sun makes his excursion south and back to the equator again, our days will be longer than the nights.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

LOOKING NORTH IN THE LATE EVENING.

On the eastern, or right-hand side of the above patch of sky, is a very conspicuous constellation called, from very early times, Pegasus, the Winged Horse. The four bright stars which form a part of the horse's body make an almost perfect square, which is known as the Great Square of Pegasus. This great square seems to trundle across the sky, for when rising it appears on one corner. By the time it has reached the meridian (about mid-night now), it has rolled over on to its base forming a square, and when it passes to the west it becomes diamond-shaped again. Those who devised the ancient constellational figures, in the days when civilisation was young upon the earth, often left the figures unfinished. Pegasus is the forepart of a horse only, the square representing half his body. From the top left-hand star, a curve of small stars marks his curved neck and head, while from the star in the lower corner a line of stars marks the forelegs. There are some small stars which represent the wings, but they must be picked out from among the tiny stars of the Winged Horse. There is a long curved line of stars stretching from the bottom right-hand star. These are the chief stars in Andromeda. A little below, a small spot marks the position of the Great Nebula in Andromeda. This may be glimpsed on a clear night as a faint hazy spot. This object does not belong to our galaxy of stars at all, but is a separate universe, perhaps as large as our own, with its hundred thousand million suns. It is situated on the far side of a gulf of space nearly one million light years across. Those who can see this, are looking at something which occurred nearly a million years ago, for the light rays which enter the eye, left their parent suns back in that distant age.

Half way up the edge of the Milky Way is Altair, with a fainter star on either side. These are the chief stars in the Eagle. As distances go in the universe, Altair is only just across the way, it being but 16 light years—one light year is about six millions of millions of miles. These three stars point down across the Milky Way to the very brilliant star Vega, in the Lyre. Vega is the brightest star in the northern hemisphere and the third brightest star in the heavens. This brilliant sun is about twenty-six light years away but he is an old slow coach.

WE TRAVEL 43,000 MILES AN HOUR.

Our sun is moving through space—and we with him—at the rate of over 12 miles a second, but Vega only shuffles along at 10 miles a second.

If we follow the direction of Altair and his two smaller companions upward, we arrive at two third mag. stars which mark the eyes of the Sea-goat, Capricornus. One of these stars is a fine naked eye double star—two suns, situated many million miles apart, which are revolving around each other.

In the lower part of the Milky Way is a great starry cross, which is sometimes called the Northern Cross. Its proper name is Cygnus, the Swan. It is a very fine constellation and bears a striking resemblance to a flying swan winging its way up the Milky Way, its outspread wings and long outstretched neck being easily picked out. The bright, white star marking the Swan's tail is Deneb, meaning Tail. The third magnitude star at the other end, which marks the head, is Beta Cygni and in a small telescope is seen to be a beautiful double star—one golden and the other blue. The lone star at the top of the picture is Fomalhaut, the chief star in the Southern Fish, Piscis Australis. The star-groups in these illustrations are drawn rather too near the horizon, in order to get the stars mentioned within the limits of the picture. They will appear higher in the heavens, especially to people in the north.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of years' records.	June, 1941.	June, 1940.		June.	No. of years' records	June, 1941.	June, 1940.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	1·75	40	0·34	3·72	Gatton College ..	1·75	42	1·11	1·09
Cairns	2·89	59	0·69	3·02	Gayndah	1·83	70	2·21	0·15
Cardwell ..	2·06	69	0·77	3·59	Gympie	2·61	71	2·69	1·13
Cooktown ..	2·01	65	1·48	1·22	Kilkivan	2·15	60	2·51	1·17
Herberton ..	1·19	55	0·22	1·75	Maryborough ..	2·96	70	2·15	0·65
Ingham	2·44	49	1·16	2·77	Nambour ..	3·70	45	3·66	3·24
Innisfail	7·34	60	1·99	15·74	Nanango	1·98	59	1·43	2·09
Mossman Mill ..	2·53	28	0·27	3·26	Rockhampton ..	2·52	70	2·76	Nil
Townsville ..	1·50	24	0·17	0·49	Woodford ..	2·80	54	2·08	1·87
Central Coast.					*Central Highlands.*				
					Clermont ..	1·65	70	3·15	0·07
Ayr	1·43	54	0·93	0·45	Gindie	1·40	42	..	Nil
Bowen	1·61	70	1·46	0·24	Springsure ..	1·73	72	3·84	0·05
Charters Towers ..	1·33	59	0·76	0·55	*Darling Downs.*				
Mackay P.O. ..	2·71	70	7·83	0·75					
Mackay Sugar Experiment Station	2·42	44	..	0·88	Dalby	1·66	71	1·04	0·94
Proserpine ..	3·25	38	1·85	1·71	Emu Vale ..	1·46	45	1·70	0·41
St. Lawrence ..	1·26	70	4·16	0·14	Hermitage ..	1·59	35	..	Nil
					Jimbour	1·55	62	1·30	1·24
South Coast.					Miles	1·71	56	1·42	Nil
					Stanthorpe ..	1·87	68	3·07	1·03
Biggenden ..	2·18	42	2·57	0·19	Toowoomba ..	2·35	69	1·81	2·11
Bundaberg ..	2·82	58	2·75	0·25	Warwick ..	1·71	76	1·64	0·64
Brisbane ..	2·64	89	1·37	1·07	*Maranoa.*				
Caboolture ..	2·76	65	1·98	2·58					
Childers	2·41	46	2·49	0·55	Bungeworgoral ..	1·15	27	..	Nil
Crohamhurst ..	4·35	48	2·85	2·87	Roma	1·51	67	0·90	0·13
Esk	2·15	54	1·66	1·84					

A. S. RICHARDS, Divisional Meteorologist.

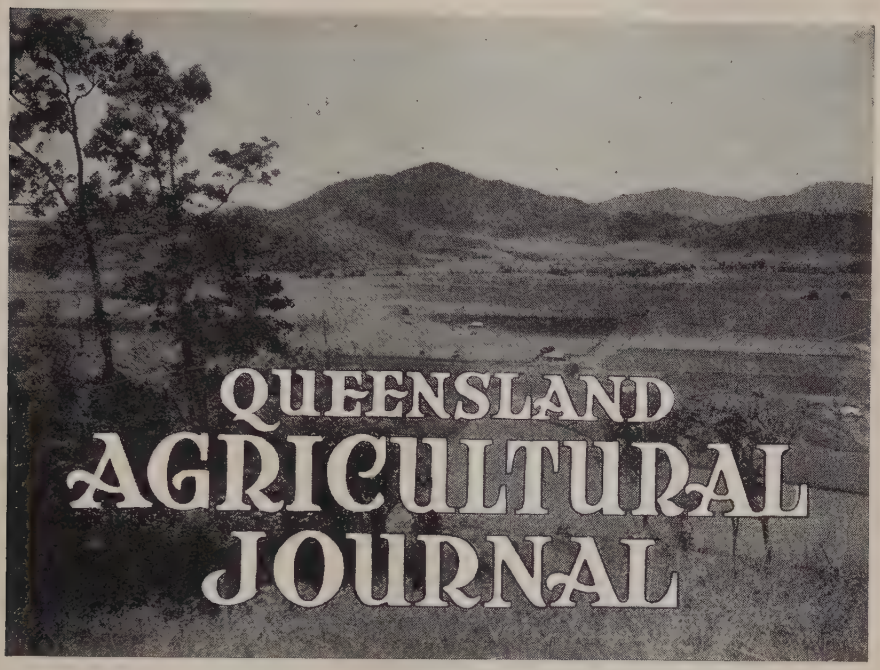
CLIMATOLOGICAL TABLE—JUNE, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	..	78	67	87	9	58	29	148	5
Herberton	..	70	49	76	8	38	23	22	5
Rockhampton	30·11	72	53	78	1, 19	42	27	276	6
Brisbane	30·12	69	52	76	19	43	28	137	8
Darling Downs.									
Dalby	..	66	43	73	5	30	28	104	8
Stanthorpe	..	68	38	64	7, 18	38	24·3, 26	307	9
Toowoomba	..	60	45	67	7	36	11	181	10
Mid-Interior.									
Georgetown	30·06	81	52	86	8, 12	37	24	63	2
Longreach	30·14	74	46	82	19	37	11, 22, 23	352	5
Mitchell	30·17	65	41	74	6	29	28	157	
Western.									
Burketown	..	79	54	85	1, 6, 7	47	23	103	2
Boulia	30	73	46	82	30	40	10, 11, 21, 23	154	4
Thargomindah ..	30.15	64	45	77	7	35	11	58	2

Contents

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



Vol. LVI. 1 SEPTEMBER, 1941 Part 3

Event and Comment

Vigilance for Victory.

IN the Old Country a Vigilance for Victory Group is busy linking up war efforts with post-war plans. Collaborating with the Vigilance for Victory Group is a Political and Economic Planning Group, and in keeping with its initial letters P.E.P., it is putting plenty of "pep" into the national cause.

Informed, searching, and constructive criticism is a characteristic of these live-wire units in Britain's planning campaign, and they accept no excuse for slackness in their particular fields. They are, in effect, a sort of observer corps to the fighter command, watching each situation as it develops in their own special sphere, and losing no time in mobilising expert opinion and determination to consider and recommend effective courses of action to the authorities.

From our own experience in the present war, and also from our own experience since the last war, we shall obviously have to prepare for and, if practicable, evolve or establish a new technique in our national economy. What has to be done is to see that "the framework of scientific co-operation and organisation is adequate both to the demands of war-time and to the reconstruction to follow."

In the foregoing is a suggestion of a double-barrelled slogan: Vigilance for Victory; Political and Economic Planning for Peace.

Sheep Blowfly Control.

SCHOOLS OF INSTRUCTION.

FOR a number of years research into the sheep blowfly problem has been actively prosecuted. Notwithstanding the fact that the results of this work have been reported in scientific and popular publications, the losses caused by blowfly attack are still serious indeed.

On reviewing the position, the Joint Blowfly Committee, representative of the Council for Scientific and Industrial Research and the New South Wales Department of Agriculture, felt that the methods of dealing with blowfly were not sufficiently known and their value not sufficiently appreciated.

Arrangements were therefore made to conduct special schools of instruction at the Animal Husbandry Farm near Sydney, and these were attended by scientific officers from all States, including four from the Queensland Department of Agriculture and Stock.

In order to disseminate as widely as possible the knowledge gained by these officers, a further school was held at the Animal Health Station, Yeerongpilly, from 5th to 8th August, 1941.

Opening of Yeerongpilly School.

In officially opening the Yeerongpilly School, the Minister for Agriculture and Stock (Hon. Frank W. Bulcock) said that on such an occasion he realised the necessity for co-operation as between the various component parts that work together to find a solution to a problem. Here was an example of that co-operation in its most practical application; the Council for Scientific and Industrial Research, the State and the University on the one hand, and on the other those whom it was sought to serve—the graziers.

Probably one of the greatest difficulties with which scientific bodies were confronted was not so much the magnitude of the problem in the laboratory, but the task of getting that knowledge out to the layman. He had long pondered on the possibility of setting up some form of organisation to translate the achievements of the laboratory to the practical man and make them applicable to industry. There was a tremendous volume of knowledge on the problem of blowfly control that had never been applied.

He believed the average grazier was keen to learn and frequently asked, "Where can I get the information I need?" There was another school of thought which adopted the attitude that when the fly came along it was "just too bad," and soon the fly would go away and everything would be well. That type of individual was a menace to the industry.

Preventable economic loss in industry, continued the Minister, was one of the big problems which we as Australians have to tackle. We were fortunate when we compared our position with that existing in other countries, but it was true that because we enjoyed some measure of immunity from the more serious, dangerous, and mortal diseases of stock, we were apt to under-estimate the seriousness of the things in our midst.

Plate 37.
At the Official Opening of the Blowfly School.

It was planned, by continuous rippling such as occurs when a stone is thrown into a pond, to set up a nucleus of information at this school and to expand that to other schools to be held in the worst fly-infested areas of the State.

There had been a tendency for the laboratory man to divorce himself from the public. Perhaps that did not apply in Queensland to the same extent as in other places. The School of Veterinary Science of the Queensland University was established—and deliberately established—in conjunction with the animal health services of the State to ensure the widest distribution of knowledge and to prevent the animal health services from becoming self-centred and self-sufficient and the University from sitting in its own corner without working in conjunction with the Department.

Plate 38.
DEMONSTRATING BREACH CONFORMATION WHICH PREDISPOSES TO FLY STRIKE.

The Council for Scientific and Industrial Research, which had carried out a great deal of research work on the blowfly problem, was anxious to make available the knowledge resulting from this work. It was interesting to record that the recommendation from the Standing Committee to the Australian Agricultural Council, that each State send delegates to a central blowfly school, was carried without debate. It was adopted unanimously by every Minister for Agriculture in Australia. The whole scheme was being financed to some extent by the Australian Wool Board, which had provided a sum of £600. The State would have to supplement that amount materially to carry out the project to a successful termination.

At one time, said Mr. Bulcock, he had asked a friend of his associated with the University of Queensland to give him in round figures the monetary value of preventable economic loss in Queensland, and he was amazed when a figure of some £10,000,000 was returned. It meant that Queensland industries were contributing £10,000,000 for which they received no dividend, and it became an overhead charge against those industries.

He had no doubt that Queensland's maximum economic loss was found as a result of tick infestation and blowfly damage. The losses caused by blowfly could be reduced considerably, not by difficult methods and costly methods, not by methods requiring laboratory determination for their application, but, so far as he could understand, by common-sense methods which the average man with ordinary intelligence could apply. Because that was so he welcomed this school. He believed it would be the forerunner of many of a similar character.

Plate 39.
This Demonstration at the Blowfly School Attracted Keen Interest.

There were many other problems confronting our primary industries, and if this proved to be the right way of carrying knowledge from the research organisation to the man earning his livelihood by participation in industry, then it would prove of great assistance to primary producers.

Every Departmental officer stationed in areas where the blowfly pest presented itself should have up-to-date knowledge in respect of the preventive and curative stages of treatment. If, having trained these officers, the Department succeeded in passing the information on to the graziers and selectors, it would be an encouragement to carry on.

If, however, there was no hearty co-operation by the graziers and selectors, it would be most difficult to proceed further. At this time of financial stringency expenditure could not be incurred needlessly and finances dissipated.

The first duty of those attending the school, continued the Minister, was to apply the knowledge gained in their own practices. Their second duty was to see that that knowledge was as widely distributed as possible. The theory that Governments should be held entirely responsible for all forms of technical education must break down under the urge of present times.

Plate 40.
JETTING SHEEP IN ELEVATED JETTY RACE OF THE TANONGA TYPE.

In conclusion, Mr. Bulcock extended congratulations to those who made the school possible. Although the Council for Scientific and Industrial Research had been criticised from time to time, it was frequently because its critics had only a limited knowledge of its wide ramifications. He thought that the Council for Scientific and Industrial Research, by its action in making the school possible, had contributed materially to the wellbeing of the nation.

Instructional Programme.

The course of instruction at the Yeerongpilly School was a very comprehensive one, and included both the theoretical and practical aspects of blowfly control. After discussing the relative importance of the various species of blowflies concerned in strike and the possibilities of their control by trapping, poisoning, and biological methods, attention

was given to the various factors which are now known to predispose sheep to blowfly attack. Measures to reduce immediate susceptibility, such as jetting, crutching, and the Mules operation, received special attention.

Each officer was given the detailed theory of the various control measures, and also had an opportunity of becoming familiar with the pactical side through personal practice. Jetting plants supplied by courtesy of various Brisbane pastoral firms were displayed and their operation explained. Demonstrations were also given of the significance of wrinkly breech, faulty withers, and bad types of wool in the predisposition of the sheep towards blowfly attack.

Dr. L. B. Bull and Dr. A. J. Nicholson, Chiefs respectively of the Divisions of Animal Health and Economic Entomology of the Council for Scientific and Industrial Research, whose visit coincided with the period of the school, addressed the school and were able to impart valuable information secured through the researches of their respective divisions.

Country Schools.

A school for Departmental officers is to be held at Blackall, and arrangements have been made, in co-operation with the United Graziers' Association and the Selectors' Association, to hold four two-day demonstration schools for sheepowners and others who are concerned in dealing with sheep blowfly. These are set down as under:—

Blackall	11th and 12th September.
Longreach	16th and 17th September.
Winton	23rd and 24th September.
Julia Creek	29th and 30th September.

To all attending these demonstration schools suitable printed material is being issued, so that they may have details for later reference.

THE NASAL FLY—A SERIOUS PEST OF SHEEP.

During the spring and summer months, graziers in many parts of the State may be puzzled for an explanation as to why their sheep, for no apparent reason, suddenly gallop round the paddock, or stand in bunches with their faces buried in each other's wool, or held very closely to the ground. If such a group is watched closely, the attitude of the animals will be seen to be due to the presence of a stout, greyish fly, which frequently is to be seen during spring time and early summer resting on the fly screens and water tanks around the homestead. This is the sheep nasal fly, which lays its maggots on the edges of the nostrils of the sheep. The action of the animals in burying their noses in the wool of other sheep, or in the soil, in an endeavour to protect them from the flies, is readily understandable.

The maggots, after they have been laid by the female fly, crawl up the sheep's nostrils and into the communicating cavities. Here they remain for several months. Being provided with a pair of stout hooks in the region of the mouth, they attach themselves to the lining of the nostrils and cause the secretion of much pus-charged mucous, on which they feed. The condition in sheep known as "snotty nose" is due to the presence of these maggots, which may also be responsible for such a severe irritation that the infested animal loses condition.

Control of the sheep nasal fly is not very effective at present, but much good can be done by daubing the animals' noses at frequent intervals with Stockholm tar. This procedure should be especially carried out between October and January, inclusive, when the flies are most numerous.

Green Manuring—Stanthorpe Investigations, 1937-40.

KEIGHLEY M. WARD, M.Agr.Sc., Research Officer.

IT is generally recognised that the addition of organic matter improves most soils because of the effect produced on their chemical, biological, and physical properties. The practice of ploughing-in green manures has consequently come to be looked upon as of fundamental importance in many branches of horticulture and agriculture. Considered broadly, the principal effect of the addition of organic matter to the soil is to increase the availability of nutrient elements which are naturally present in the soil, or which have been added as artificial fertilizers.

In general, the soils of the Stanthorpe district are low in organic matter in the virgin state, and continuous cultivation leads to the rapid depletion of their humus content. The building up and maintenance of a supply of soil organic matter thus forms one of the most important of a group of operations that are fundamental to the proper nutrition of crop plants in this district. There are many difficulties, however, brought about mainly by climatic and soil factors, which limit the growth of green manures at Stanthorpe, and in consequence satisfactory crops of green manure are not common, the yield of green matter generally ranging from 1 to 4 tons per acre. This is inadequate, and the position definitely calls for improvement. Such an improvement can be expected only when important climatic and soil factors are given due consideration.

The climate of the district is characterised by an annual rainfall of 30 inches, 40 per cent. of which falls in the autumn and winter months, the latter season usually being the driest period of the year. Rainfall is rather uncertain in all seasons, and periods of little or no effective rain occur fairly frequently. This and a high rate of evaporation sometimes cause sufficient drying out of the soil to restrict the growth of crops, and the need for the employment of moisture conservation practices in all branches of local farming requires little stressing. Winter frosts, which are numerous and severe, are another climatic feature of the district; over a period of thirty-four years the mean minimum air temperatures for June, July, and August have been 36·6 deg., 33·2 deg., and 35 deg. F., respectively, whilst during this period minimum grass temperatures have occasionally reached 6 deg. F.

The soils of the district consist of decomposed granite, and are generally of a coarse-grained, sandy texture. After rain, they almost invariably form a rather hard surface crust, which is partly attributable to lack of organic matter. The level of fertility of these soils is such that successful crop production, including the growing of green manure crops, depends largely on the judicious use of fertilizers, for plants growing in them frequently exhibit deficiencies in major and trace elements, lack of nitrogen being particularly evident.

From the foregoing it is apparent that successful cultivation of green manures in the Stanthorpe district depends very largely on supplying nutrient elements in which the soil may be deficient and planting varieties that are drought and frost resistant. Since 1937, various aspects of the green manuring problem have received attention,

and this article deals with that part of the work concerned with determining the nitrogen, phosphoric acid, and potash requirements of green manure plants, and with the testing of potentially suitable varieties. On account of the necessity for conserving moisture during the main growing season, attention has been focussed chiefly on winter green manure crops.

FERTILIZER EXPERIMENTS.

During the past four years a series of fertilizer experiments has been conducted on cereal and leguminous crops. The experiments were laid down in apple orchards which differed with respect to the age and condition of the trees, soil types, and location in the district, and were set out in designs which allowed statistical examination of all quantitative data. The size of the plot adopted throughout the work was 60 feet by 15 feet, and the yield of green matter was measured by cutting and weighing ten 1-square-yard random samples in each plot. Prior to sowing, the land was ploughed and harrowed, the fertilizers usually being turned under in the ploughing process; the seed was then broadcast and harrowed in. Sometimes the fertilizers and seed were broadcast at the same time and then covered. In ensuing months, observations were made on the rate of growth and general condition of the crops, and the samples were taken immediately before the plants reached the flowering stage.

1937 Experiments.

In 1937, two experiments were conducted at The Summit in a nineteen-year-old orchard in which the trees, although not very vigorous, had previously made good growth and were still bearing satisfactory crops. The soil had received moderate applications of mixed fertilizers in previous years. The plants employed were Florence wheat and New Zealand blue lupins. The value of the 4·76 inches of rain that fell during the four-month growing period of the plants was considerably reduced by its unsatisfactory distribution.

TABLE 1.

Showing the Influence of Fertilizers on the Yield of Green Matter of Florence Wheat and New Zealand Blue Lupins. The Summit, 1937.

Treatment.	Rate of Application in Cwt. per Acre.	Yield of Green Matter in Tons per Acre.	
		Wheat.	Lupins.
1. N—Sulphate of ammonia	2	3·33	2·44
2. P—Superphosphate	2	1·25	1·13
3. K—Sulphate of potash	2	1·47	1·31
4. NP—Sulphate of ammonia and superphosphate	2, 2	4·14	2·65
5. NK—Sulphate of ammonia and sulphate of potash	2, 2	3·76	2·14
6. NPK—Sulphate of ammonia, superphosphate, and sulphate of potash	2, 2, 2	4·19	2·65
7. KMg—Sulphate of potash and magnesium sulphate	2, 1	1·15	1·21
8. No fertilizer	..	1·17	1·20
Standard errors	..	0·236	0·199
Significant differences	..	0·68	0·58

The results of the experiments (Table 1) show that, in so far as wheat is concerned, all treatments in which nitrogen was included gave

considerably greater yields than those from which nitrogen was omitted (Plate 41). These latter treatments, Nos. 2, 3, and 7, produced no increased growth response whatever when compared with untreated plots. Another feature of the results was that plots receiving superphosphate with sulphate of ammonia (*i.e.*, treatments 4 and 6) showed a definite increase in yield when compared with those receiving sulphate of ammonia only. It was evident, too, that the addition of potash to the mixture of sulphate of ammonia and superphosphate did not lead to a further increase in yield. In general, plots which received nitrogen produced three times as much green matter as those to which nitrogen was not added.

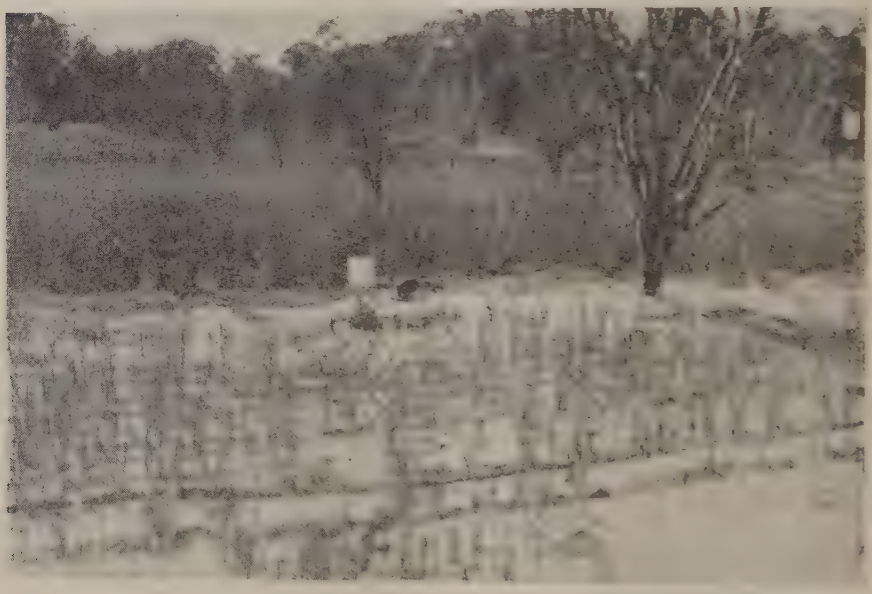


Plate 41.

PLOT OF FLORENCE WHEAT.—Plot of Florence wheat in foreground received 2 cwt. superphosphate per acre and yielded 1.3 tons per acre. Plot in background received 2 cwt. sulphate of ammonia per acre and yielded 3.5 tons per acre. Marked response on latter plot occurred despite dry weather.

Somewhat similar results were obtained when the same treatments were applied to lupins. Here again, all plots in which nitrogen was present yielded considerably more than those from which it was absent, and the latter actually produced no more green matter than unfertilized plots. In the case of lupins, however, sulphate of ammonia was as effective alone as when combined with any of the other fertilizers. Neither superphosphate nor sulphate of potash, used either alone or in combination, brought about any increase in yield. Lupin plots receiving nitrogen produced double the amount of those not receiving this element.

It is noteworthy that, despite the occurrence of unfavourably dry weather conditions, the influence of the effective fertilizers was felt in a marked degree as can be seen from Plate 41.

1938 Experiments.

The site of the 1938 experiments was a non-bearing, three-year-old apple orchard in which vegetables had been grown for some years, during which time the soil had received applications of sheep manure and sulphate of potash. In these experiments the plants used were Black Winter rye and New Zealand blue lupins, which are later usually referred to simply as rye and lupins respectively. During a growing period of five months the plots received a well-distributed rainfall of 8·14 inches.

TABLE 2.

Showing the Influence of Fertilizers on the Yield of Green Matter of Rye and New Zealand Blue Lupins. The Summit, 1938.

Treatment.	Rate of Application in Cwt. per Acre.	Yield of Green Matter in Tons per Acre.	
		Rye.	Lupins.
1. N_1—Sulphate of ammonia	1	8·95	2·75
2. N_2—Sulphate of ammonia	2	9·97	3·35
3. NP—Sulphate of ammonia and superphosphate	2, 2	8·68	5·08
4. NK—Sulphate of ammonia and sulphate of potash	2, 2	9·24	2·79
5. PK—Superphosphate and sulphate of potash ..	2, 2	6·01	2·11
6. NPK—Sulphate of ammonia, superphosphate, and sulphate of potash	2, 2, 1	9·60	3·50
7. Ca—Lime	3	5·95	1·72
8. NCa—Sulphate of ammonia and lime	2, 3	8·76	4·02
9. No fertilizer	..	5·29	3·30
Standard errors	..	0·777	0·524
Significant differences	..	2·27	1·53

The treatments given and the results obtained in this experiment are presented in Table 2. This table shows that in the rye plots the three treatments from which nitrogen was excluded, *i.e.*, Nos. 5, 7, and 9, gave similar yields, all of which were significantly lower than those given by the other six treatments in which nitrogen was included. There were no significant differences between any of these six latter treatments. The application of 1 cwt. of sulphate of ammonia per acre in treatment 1 in this orchard was practically as effective as the 2 cwt. in treatment 2, and sulphate of ammonia gave as great a response when used alone as when combined with other fertilizers. The results obtained were undoubtedly influenced by residues from fertilizers used previously in the orchard. Plots receiving nitrogen made excellent growth, the plants commonly attaining a height of 5 feet (Plate 42). Lupins yielding a comparable amount of green matter in a varietal experiment in the same year were only 15 to 18 inches in height (Table 3 and Plate 52). This height factor is important in connection with the effective ploughing-in of the crop.

With respect to the lupins, the results were somewhat affected by factors other than the fertilizers, and in particular poor drainage in some plots was no doubt responsible for the high variation in the yields obtained. Under the conditions prevailing, sulphate of ammonia, together with superphosphate, in treatment 3 produced a marked increase in the yield of lupins. This treatment was significantly superior to all

others excepting the nitrogen-lime combination in treatment 8, but since the latter treatment did not give a significantly higher yield than the unfertilized plots, no great importance can be attached to it. The yield of lupins in limed plots was actually less than in unfertilized plots.

Plate 42.

WELL-GROWN CROP OF RYE FOR GREEN MANURE.—This plot received 2 cwt. sulphate of ammonia per acre and yielded 10 tons per acre.

1939 Experiments.

Prior to the 1939 experiments, the fertilizers had been applied in approximately balanced proportions—*i.e.*, equivalent amounts of nitrogen, phosphorus, and potash had been given. It was now considered desirable to discover the effects of the fertilizers when combined in varying proportions. Accordingly, in 1939, experiments were designed to study the effects on green manure crops of a nitrogenous fertilizer, superphosphate, and sulphate of potash when applied at three different levels or rates of application, and in all possible combinations with each other. Four factorial experiments were laid down in the autumn of 1939, one on rye and one on Dun field peas, in each of two widely separated parts of the district, viz., Cottonvale and Glen Aplin. The soil types of these areas differ somewhat; that at Cottonvale showing evidence of having passed through an alluvial phase, though it is of granitic origin, whilst that at Glen Aplin is a typical residual granitic soil. The experimental blocks were laid down in nineteen-year-old apple orchards, both of which were showing marked effects of depleted soil fertility. The treatments applied and the rates of application at Cottonvale were as follows:—

Fertilizer.		Level.		
		0	1	2
N = Nitrate of soda	Cwt. per acre	0	1½	2½
P = Superphosphate		0	1	2
K = Sulphate of potash		0	½	1

At Glen Aplin, the treatments given were the same except that sulphate of ammonia replaced nitrate of soda as the source of nitrogen, and was used at the rate of 0, 1, and 2 cwt. per acre. During the four-month growing period a well distributed rainfall amounted to 6.56 inches.

Responses on Rye Plots.

An analysis of the samples showed that highly significant results were obtained in both experiments on rye. The main results from the Cottonvale plots are expressed in Plate 43, which shows the interactions of the three fertilizer materials at the various levels of application.

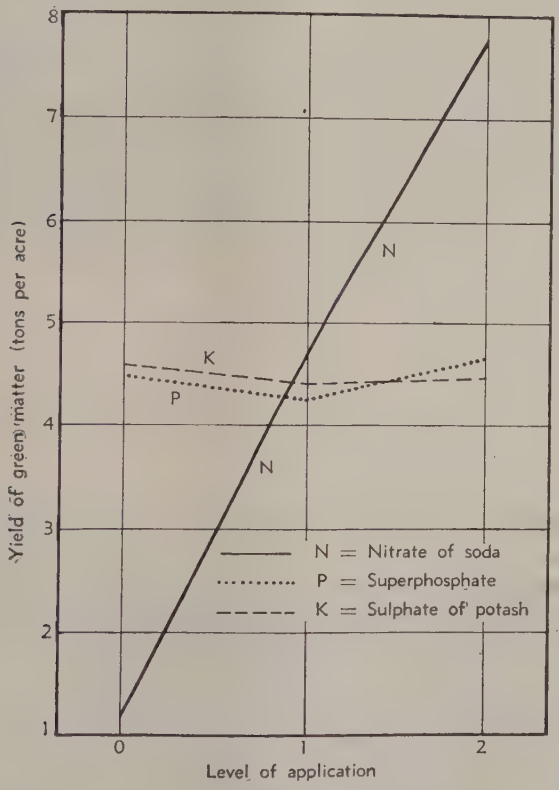


Plate 43.

Fertilizer Experiment at Cottonvale, 1939.—Showing interactions between nitrate of soda (N), superphosphate (P), and sulphate of potash (K) on rye plots.

There was a most striking response to the $1\frac{1}{4}$ cwt. and $2\frac{1}{2}$ cwt. levels of nitrate of soda, as is shown by the steep upward slope of the curve for N which rises from 1·16 tons of green matter per acre at the 0 level to 4·62 tons at the $1\frac{1}{4}$ cwt. level, and to 7·61 tons at the $2\frac{1}{2}$ cwt. level (Plate 44). The degree of response to this fertilizer is almost directly proportional to the amount applied, the yield given at N_1 being approximately half way between those given by N_0 and N_2. This result suggests that the yield might have been still further increased by heavier applications of nitrate of soda, and points to a serious nitrogen deficiency in the orchard soil involved. The ability of rye to establish itself and to grow through the winter months was most marked, particularly in plots that had

Plate 44.

PLOT OF RYE.—Plot on left received 2½ cwt. nitrate of soda and yielded 7.7 tons green matter per acre; plot in foreground received 1 cwt. sulphate of potash and yielded 1.5 tons per acre.

received nitrogen; indeed, differences between plots receiving nitrogen and those from which nitrogen was omitted were very striking almost from the time the plants first appeared aboveground.

Plate 45.

ANOTHER PLOT OF RYE.—This rye plot received 1 cwt. each of superphosphate and sulphate of potash per acre; it yielded 1.4 tons per acre.

Superphosphate and sulphate of potash, applied singly or in combination, produced no significant growth response at any level of application, as is indicated in Plate 43 by the flatness of the P and K curves. Plots receiving these two fertilizers yielded about 1 ton of green matter per acre (Plate 45); this was comparable with the yield obtained in unfertilized plots. The relative effectiveness of the different fertilizers is emphasised in Plate 46.

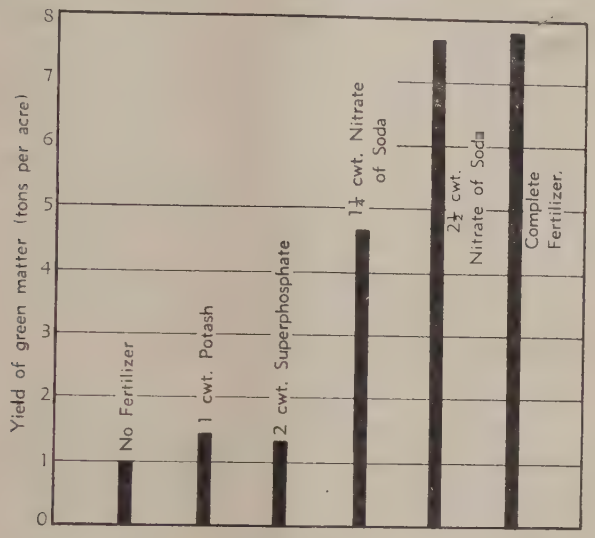


Plate 46.

Fertilizer Experiment at Cottonvale, 1939.—Showing marked responses to applications of nitrate of soda on rye plots in a low-vigour, nineteen-year-old apple orchard at Cottonvale.

In the second experiment on rye, that at Glen Aplin, where the same treatments were applied, the results obtained were generally similar to those of the Cottonvale experiment. Here, again, the nitrogenous fertilizer, this time sulphate of ammonia, produced large and highly significant responses (Plate 47).

The first application of sulphate of ammonia, i.e., 1 cwt. per acre, increased the yield of green matter from 1·71 tons per acre to 4·24 tons, and the second application of 2 cwt. per acre increased it further to 5.85 tons. The increase from the second application was, however, significantly less than the increase from the first, and this would appear to indicate that 2 cwt. per acre is approaching the maximum desirable quantity. Superphosphate gave no significant response whatever, whilst sulphate of potash gave a significant though small increase with an application of 1 cwt. per acre. In this experiment potash tended to lead to increased yields at the highest level of sulphate of ammonia (Plate 47).

Responses on Pea Plots.

At Cottonvale, significant increases in yield followed the use of all fertilizers at one or other of the levels employed. The 1¼ cwt. per acre level of nitrate of soda gave a well-marked response by increasing the quantity of green matter from 1·96 to 3·06 tons per acre as shown in

Plate 48. The highest level of 2½ cwt. per acre did not cause a significant increase in yield over that obtained at the lower level, although there was still an upward trend. Plots receiving potash at the rate of ½ cwt. per acre yielded significantly more than either the no-potash plots or those receiving 1 cwt. per acre. In other words, ½ cwt. of potash gave an increase in yield, but 1 cwt. of this fertilizer tended to depress it. With respect to superphosphate, at the level of 1 cwt. no increase in yield occurred; but the higher application of 2 cwt. per acre caused a well-marked rise from 2·15 to 3·93 tons of green matter per acre. These responses of P and K were noticeable in both the presence and the absence of nitrogen.

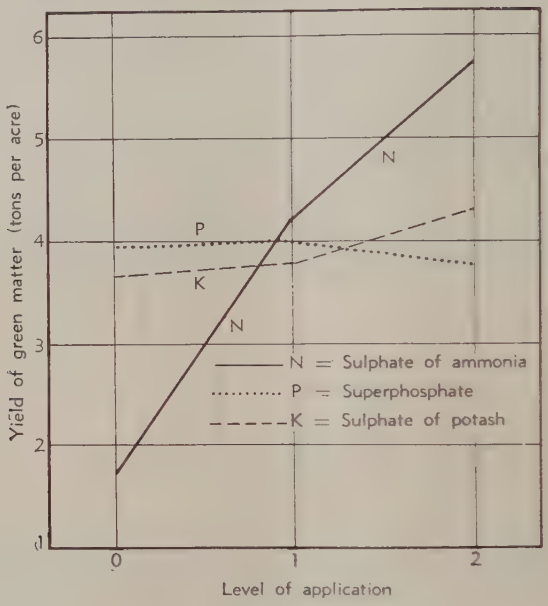


Plate 47.

FERTILIZER EXPERIMENT AT GLEN APLIN, 1939.—Showing interactions between sulphate of ammonia (N), superphosphate (P), and sulphate of potash (K) on rye plots.

A study of the interaction of nitrate of soda and superphosphate in these plots showed that the heaviest application of superphosphate was more beneficial when applied in conjunction with the highest level of nitrate of soda. In the interaction of sulphate of potash with superphosphate the depression of growth resulting from the higher level of potash was more marked at the higher level of superphosphate.

The results obtained at Glen Aplin (Plate 49) differed in some respects from those at Cottonvale. In the Glen Aplin plots sulphate of ammonia caused significant responses at both rates of application. This fertilizer applied at the rate of 1 cwt. per acre increased the yield from 0·76 tons to 1·35 tons, whilst 2 cwt. increased it to 2·35 tons. An application of 1 cwt. of superphosphate led to a small increase in yield from 1·21 to 1·76 tons per acre, but 2 cwt. did not give any further increase. Potash gave no significant responses in the experiment. The relatively low yield of green matter in even the best of the pea plots is noteworthy, indicating as it does the difficulty experienced with field peas in producing that bulkiness of crop which is so desirable.

1940 Experiment.

In the 1940 experiment, which was laid down in April, all possible combinations of nitrate of soda, superphosphate, and sulphate of potash at three levels were applied in a factorial layout in which lupin plants were sown. Unfortunately, the experiment was marred by an

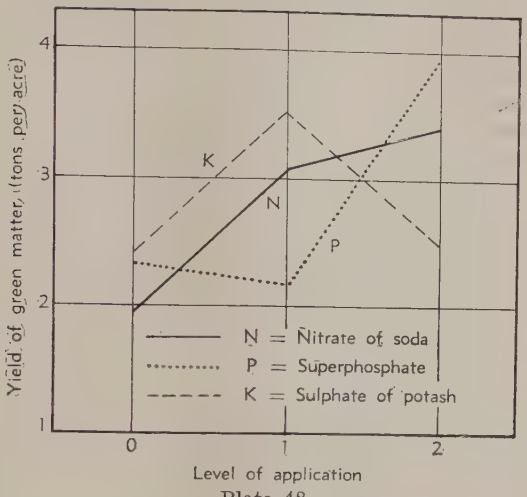


Plate 48.

Fertilizer Experiment on Field Peas at Cottonvale, 1939.—Showing interactions between nitrate of soda (N), superphosphate (P), and sulphate of potash (K).

unusually poor germination of seed which ranged from 10 per cent. to 20 per cent. in the field. In these circumstances no quantitative results could be secured, but a most marked improvement in growth was obtained in plots receiving mixtures of fertilizers containing nitrogen. In these plots the plants made healthy growth under conditions imposed by severe frosts occurring sometimes below 10 deg. Fahr., and by winter drought which resulted from a fall of only 2·15 inches of rain during the five-month growing period of the plants. Frost injury in fertilized plots, all of which received nitrate of soda, could not be regarded as having been severe, and the plants reached a height of 12 inches. In

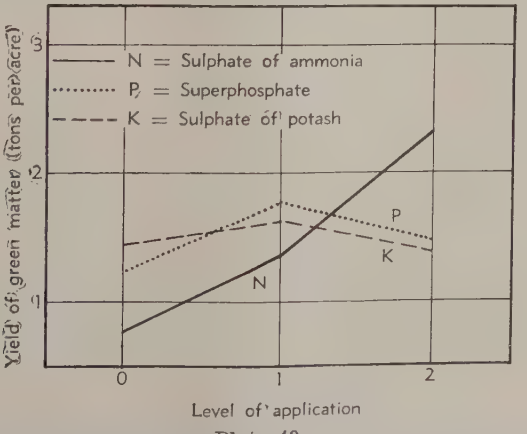


Plate 49.

Fertilizer Experiment on Field Peas at Glen Aplin, 1939.—Showing interactions between sulphate of ammonia (N), superphosphate (P), and sulphate of potash (K).

unfertilized plots more than half the plants died, and those surviving were severely stunted, attaining a height of only 3 or 4 inches. It appeared from this result that the fertilizers were effective in increasing the resistance of the plants to frost and drought injury. Laboratory germination tests showed that 77 per cent. of the seed used in this experiment was viable. The cause of the particularly low germination in the field is under investigation.

Discussion on Fertilizer Experiments.

In all the experiments described above, nitrogenous fertilizers have given outstanding results. Cereal crops have responded very strikingly and consistently to applications of nitrate of soda and sulphate of ammonia, irrespective of whether they were applied alone or in combination with superphosphate or sulphate of potash, or with both these fertilizers. Average increases in the yield of green matter have been sixfold in old orchards of low vigour, and twofold in young orchards in which soil fertility was still comparatively high. Fertilizers containing phosphoric acid and potash have caused no marked response in any of the experiments on cereals, and in view of the healthy growth of plants in plots receiving nitrogen only, it appears that they received adequate supplies of phosphoric acid and potash from the soil. This does not prove, however, that the supplies of these elements are adequate for all crops which might be planted, nor even for a succession of green manure crops.

Responses by leguminous crops, whilst not as spectacular as those by cereals, have been none the less definite. With legumes, nitrogenous fertilizers again played a prominent part, and produced the greatest increases in yields of lupins and field peas, while superphosphate has caused small but significant increases on several occasions. The best results tended to be given by a mixture containing a nitrogenous fertilizer and superphosphate. Potash was responsible for a slightly increased yield in only one of the four experiments in which it was used on legumes.

The effect of nitrogenous fertilizers on the type of plant produced has been most striking, especially where cereal varieties are concerned. Cereals receiving treatments involving the application of superphosphate in the absence of nitrogen, whether or not potash was present, have invariably developed into spindly, stunted plants with only two to five tillers and sparse flag formation (Plate 50).

The colour of these plants was always pale-green to yellowish, a condition usually indicative of nitrogen starvation. Unfortunately, cereal crops consisting almost entirely of plants of this type are far too common in Stanthorpe orchards and vineyards. The growing of such crops as these plainly represents wastage in labour and materials. Where a nitrogenous fertilizer was applied at the time of sowing a cereal crop, a beneficial effect on growth was noticeable very soon after germination, and this effect became more and more marked as growth continued. The plants were very different from those described above, their colour now being a healthy deep-green, their rate of growth increased, and, most important, tillering and flag production multiplied many times, 12 to 30 tillers being produced per plant (Plate 50).

In legumes, nitrogen deficiency is most marked in the early stages of growth. Peas and lupins show this deficiency in the first few weeks after germination by the slow and stunted growth of the plants, and by

a red or crimson colouration of the foliage, especially in leaves near the base of the stem. As the plants grow older, newly-formed leaves may be a normal green colour, if root nodule bacteria have become active and are supplying the plant with nitrogen fixed from the atmosphere. In many experimental plots the plants did not reach this second stage, but remained stunted, unhealthy in colour, and often died. This would seem to indicate that in these cases not only was the soil very deficient in nitrogen, but also that the appropriate strains of nitrogen-fixing bacteria were absent.

Plate 50.

Influence of Nitrogen on Growth of Rye Plants.—Plants on left typical of those from no-nitrogen plots. Plant on right from plot receiving 2 cwt. nitrate of soda per acre.

GREEN MANURE CROP VARIETAL EXPERIMENTS.

In experiments with green manure crops, the varieties were sown in randomised blocks each of which was replicated four times. In the first two years the plots were fertilized with 1½ cwt. of sulphate of ammonia, 1½ cwt. of superphosphate, and ¾ cwt. of sulphate of potash per acre, but subsequently potash was omitted. Methods of sowing and sampling the plots were the same as in the fertilizer experiments, and the usual observations on growth habits, reactions to climate, &c., were made.

1937 Experiment.

The varieties tested in 1937 were Dun field peas, tick beans, New Zealand blue lupins, subterranean clover, Florence wheat, and Cape barley. The experiment was so designed that a comparison could also be

made between legumes inoculated with the correct strains of nodule bacteria and those not inoculated.* Very little rain fell in the four months following the sowing of the crops, and this resulted in the failure of most varieties, so that no quantitative data were obtained. At the ploughing-in stage the growth made by the lupins was notably better than that of any other crop (Plate 51). The other legumes and the two cereals made very poor growth, but the clover plants were healthy and would probably have made good growth during the spring.

1938 Experiment.

The above experiment was repeated in 1938 on the same site at The Summit as was used in 1937, but with the addition of three other varieties, viz., rye, Golden tares, and red clover. The original varieties were sown in the same plots as they had occupied in the previous year, so that observations could be made in connection with the nitrogen-fixing organisms. The additional legumes were not inoculated.

During their growing period, the crops received sufficient rain to preclude the possibility of soil dryness being a factor limiting their growth, but the usual frosty conditions prevailed throughout. Under these generally favourable growing conditions the growth made by the different varieties was strongly contrasted (Plate 52). Since the clovers made very little growth they were not sampled and do not therefore appear in the table of results.

TABLE 3.

SHOWING RATE OF YIELD OF GREEN MATTER BY GREEN MANURE CROP VARIETIES. SEEDING RATE 80 LB. PER ACRE FOR EACH VARIETY. THE SUMMIT, 1938.

Variety.	Yield of Green Matter in Tons per Acre.	Variety.	Yield of Green Matter in Tons per Acre.
1. Dun field peas (*a*)*	1·51	6. Lupins (*b*)	10·50
2. Dun field peas (*b*)*	2·45	7. Golden tares ..	7·42
3. Tick beans (*a*) ..	3·24	8. Wheat	2·21
4. Tick beans (*b*) ..	4·41	9. Rye	2·59
5. Lupins (*a*)	10·72	10. Barley	1·52
Standard error	·321		
Significant difference	·94		

* (*a*) Soil inoculated with appropriate strain of root nodule bacteria ; (*b*) soil not inoculated.

In Table 3 the final results are expressed in terms of tons of green matter produced per acre. Field peas and tick beans made relatively poor growth when compared with lupins and Golden tares. A high proportion of the field pea plants was partly or wholly dried up, owing to their inability to withstand the severe frosts, whilst tick beans, although not showing frost injury, were rather stunted and produced an inadequate quantity of green matter. Nevertheless, this latter crop yielded significantly more than wheat and barley or peas on inoculated soil. Although the field peas and tick beans gave better results in 1938 than in the previous year, they did not make satisfactory growth in this experiment. However, apart from the experimental plots, field peas made relatively good growth in 1938 in a number of orchards where frosty conditions were less severe.

* Bacterial cultures for this and other experiments were supplied by the Waite Agricultural Research Institute, South Australia.

From Table 3 it is obvious that lupins and Golden tares made vigorous and extensive growth despite numerous frosts, and gave yields which amounted to more than 10 and 7 tons per acre respectively, and were thus outstanding as compared with any other varieties. From the figures it seems that these two crops can make sufficient growth between mid-autumn and early spring to produce a bulky crop of green matter provided they receive adequate fertilizer applications. The main grow-

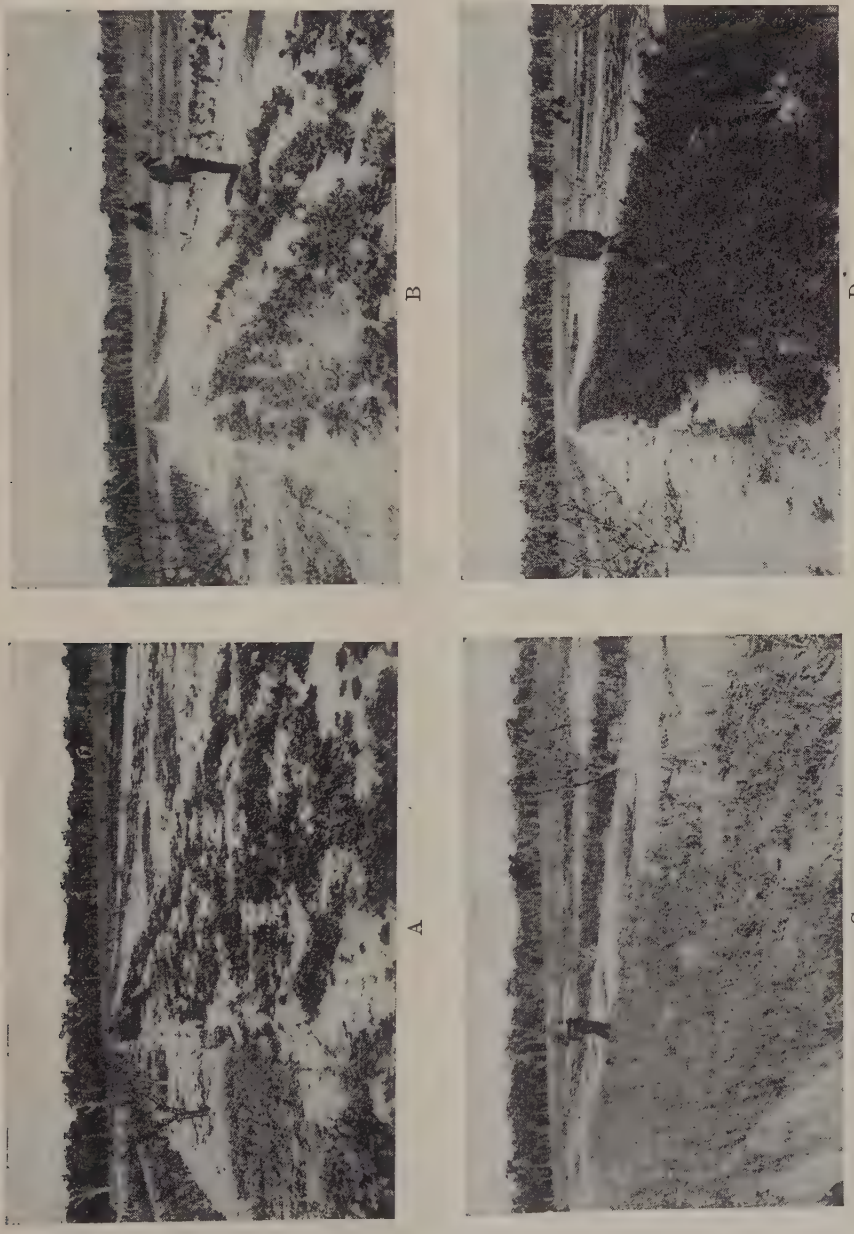


Plate 51.
Contrasts in Growth made by Various Green Manure Crops under Dry Winter Conditions, 1937.—(A), Dun field peas; (B), tick beans; (C), Florence wheat; (D), New Zealand blue lupins.

ing period of the lupins, i.e., between germination and the commencement of flowering, amounted to 142 days, while that of Golden tares was about 165 days.

All of the cereal crops in the test made unsatisfactory growth, but significant differences were revealed. Barley, wheat, and rye were inferior to tick beans, Golden tares, and lupins, but rye gave better results than barley and field peas. The cereal plants were generally characterised by spindliness, poor flag growth, paucity of tillers, and paleness of foliage; while the barley was extensively attacked by rust disease. These conditions suggest deficiencies in soil nutrients, but since the plots received an application of $3\frac{3}{4}$ cwt. per acre of a mixture of sulphate of ammonia, superphosphate, and sulphate of potash (2:2:1), it would seem that the growth of the plants was limited by soil deficiencies other than of these particular elements. In other words, the soil requirements in this orchard were apparently not satisfied by supplying N, P, and K only. It is noteworthy that rye grown in a fertilizer experiment in another orchard during the same season made excellent growth, as can be seen from the results of the 1938 fertilizer experiment and from Plate 42. The growing periods of the cereals were—wheat 114 days, rye 125 days, and barley 120 days.

Plate 52.

GENERAL VIEW OF GREEN MANURE CROP VARIETAL EXPERIMENT, 1938.—Note strong contrasts between plots containing different varieties.

That legumes grown in plots which had been inoculated in the previous year did not differ significantly from those grown in uninoculated soil is not explicable from the information so far available. Root examinations revealed that the amount and type of nodulation on any one variety were somewhat similar, irrespective of whether or not the variety was grown in inoculated soil. In a legume experiment carried out in the winter of 1938 no significant differences in yield were shown between inoculated and uninoculated plants. These results suggest that

in this instance the growth of the legumes was limited by factors other than the presence or absence of suitable strains of bacteria, but it is not considered that this should be construed as meaning that these organisms are of little importance.

1939 Experiment.

The results obtained in the 1939 experiment, which included Golden tares, Purple vetch, tick beans, Grey field peas, Dun field peas, and rye, are shown in Table 4 in which low-yielding and high-yielding varieties are separated into two groups. In the former group, Purple vetch yielded less than any other variety, and the remaining two varieties gave comparable amounts of green matter. The yield given by Golden tares sown at the rate of 90 lb. per acre was equivalent to that obtained at 60 lb. per acre. Further, the combination of tick beans with Golden tares did not lead to any increase in the amount of the crop. The yield of some of the varieties in this experiment was influenced by the late sowing of the crops.

TABLE 4.

Showing Rate of Yield of Green Matter by Green Manure Crop Varieties. Thulimbah, 1939.

Variety.	Rate of Seeding per Acre.	Yield of Green Matter in Tons per Acre.
1. Golden tares	90 lb.	2·5
2. Golden tares	60 lb.	2·7
3. Purple vetch	20 lb.	1·8
4. Tick beans and Golden tares	45 lb. each	3·2 (0·9 beans + 2·3 tares)
Significant difference 0·75 for varieties 1 to 4.		
5. Rye	90 lb.	4·3
6. Grey field peas	90 lb.	3·9
7. Grey field peas	60 lb.	3·6
8. Dun field peas	60 lb.	4·2
9. Grey field peas and rye	45 lb. each	4·2 (0·3 peas + 3·9 rye)
10. Golden tares and rye	45 lb. each	4·6 (0·3 tares + 4·3 rye)
11. Grey field peas and Golden tares ..	45 lb. each	4·0 (2·2 peas + 1·8 tares)
Significant difference 1·05 for varieties 5 to 11.		

In the second group all varieties and combinations must be considered as having given comparable results, since none of the differences in yield is significant. Grey field peas yielded the same amount of green matter when sown at the rate of 60 lb. per acre as when sown at the rate of 90 lb. per acre.

No increase in yields resulted when varieties were combined together in pairs, each at a reduced rate of seeding. In three of the four combinations one of the varieties was markedly predominant over the others. This was particularly evident in the rye-field peas and rye-Golden tares combinations in which rye formed 93 per cent. and 94 per cent. respectively of the total yields. The domination of rye was due to its growth being more rapid in winter than that of the other varieties. Observations on these plots suggest that the combinations would have been more effective if the relative seeding rates had been altered so that the amount of rye seed sown was considerably less than that of the legumes. In the field pea-Golden tares combination each produced much the same quantity of green matter, the total being made up of 55 per cent. field peas and

45 per cent. Golden tares. It is noteworthy that rye when sown at 90 lb. per acre yielded essentially the same quantity of green matter as when sown at 45 lb. per acre in combination with golden tares. This indicates that, within limits, heavier sowing of seed does not lead to increased quantities of green matter.

1940 Experiment.

Crops grown in the 1940 experiment were New Zealand blue lupins, Golden tares, Dun field peas, fenugreek, rye, and Sunrise oats. Just prior to sowing in early April the plots received 2 inches of rain, but in the ensuing five months only 2·15 inches of rain fell, little of which was effective. During this period of drought the plants were subjected to numerous and severe frosts, some of which occurred at grass temperatures in the vicinity of 10 deg. Fahr. Under these conditions the crops did not make much growth, but useful information was obtained on the drought and cold resisting qualities of the plants. Notes on the performance of the 1940 crops are included in the following discussion on varieties.

GENERAL NOTES ON VARIETIES.

The ability of the **New Zealand blue lupin** (Plate 53) to resist the droughty and frosty conditions which often occur in winter at Stanthorpe at once marks it as a desirable type of green manure plant for this district. Frost injury had not occurred in any of the lupin plots until the severe winter of 1940. At this time a few plants were killed and others bore an injury on the main stem near ground level. This damage did

Plate 53.
THREE PLANTS OF NEW ZEALAND BLUE LUPINS GROWN DURING AUTUMN AND WINTER, 1939.

not appear to interfere with the growth of the plants which generally remained healthy, though, of course, somewhat stunted by the drought conditions. Observations show that the degree of susceptibility of lupins to frost injury is considerably influenced by the vigour of the plants and that this susceptibility is increased particularly at the stages immediately after germination and just prior to flowering. Of the legumes under investigation this year, lupins were the least affected by frost, and further, the only effective leguminous crops observed in the district in 1940 consisted of lupins alone or in combination with Golden tares. The varietal experiments must be considered to have demonstrated that the lupin plant is well suited to local climatic and soil conditions, and it may be noted that this is in conformity with experience on similar soils in other parts of the world.

Plate 54.

New Zealand Blue Lupin Crop Grown in 1938 Varietal Experiment.—Some plots yielded 16 tons of green matter per acre.

In the various experiments lupins have yielded much more heavily than other legumes (Plate 54), and when compared with cereals have more than equalled an exceptionally good crop of rye. In some instances, however, lupins, in common with other legumes, do not give a really satisfactory yield of green matter in the first year of planting, but such an occurrence does not condemn the plant as being unsuitable. Improvements in growth in the second and subsequent years can be expected with the development of the correct strains of bacteria in the soil. The successful establishment of any leguminous crop under Stanthorpe conditions may require not only the use of fertilizers, but also the artificial inoculation of the seed with appropriate strains of bacteria.

Lupins do not make extensive winter growth, and it therefore appears to be necessary to sow the crop in time for it to receive the full benefit of autumn rains, and so that the plants will be well established before the winter. They make rapid growth in early spring. The lupin

plant contains an alkaloid which is present most abundantly at the stage of seed formation, and this alkaloid may be toxic to farm animals if sufficient of the plant be consumed.

Golden tares are capable of producing a heavy crop of green matter and seem to be well suited to local climatic and soil conditions (Plate 55). Although very resistant to cold, this variety may be damaged to a small extent by severe frosts, and in this respect is a little more susceptible than lupins. It withstands drought conditions very well. Its growing period is about three to four weeks longer than that of lupins, and for satisfactory growth it should be sown early in autumn. It breaks down rapidly after being turned under.

Plate 55.
GOLDEN TARES YIELDING 7 TONS GREEN MATTER PER ACRE, 1938.

Dun field peas have been used in the trials more than any other variety of field peas, and it is rather significant that the best yield given by this variety during the four years was 4.2 tons per acre. This cannot be considered a satisfactory quantity of green matter. Though the variety may be resistant to frosts of moderate intensity, it is often seriously injured or killed outright by severe frosts (Plate 56); in 1940 most of the field pea plots were completely destroyed by frosts. Grey or Partridge field peas were used only in 1939, when their yield was similar to that of the Dun variety. Their performance under intense frosts has not yet been determined in experiments. Although

Dun field peas are probably used more commonly in the district for green manuring than any other legume, their performance in comparative experiments does not suggest that they possess any particular merit to justify that popularity.

Tick beans make little growth in winter, but provided sufficient moisture is available, they can survive the cold and will make fairly good growth in autumn and spring. Although they appear to be more resistant to frost injury than Dun field peas, they seem to be very adversely affected by dry winter conditions, and for this reason they show little promise of being successfully employed as a regular winter green manure crop in the Stanthorpe district.

Plate 56.
Dun Field Peas Yielding 1·8 Tons per Acre, Damaged by Frost, 1939.

Purple vetch is somewhat slow growing and under Stanthorpe conditions seems to be quite unable to yield a bulky crop of green matter. For optimum growth the plant apparently requires more winter rain than usually falls in this district. It may be noted that common vetch grows along orchard headlands and in other situations in a wet winter, but is not in evidence under dry conditions.

The experiments have shown that subterranean clover (*Trifolium subterraneum*), red clover (*T. pratense*), and Bokhara clover (*Melilotus alba*) are not suitable for winter green manure crops at Stanthorpe. When sown in mid- to late autumn germination is very slow, and growth made during the winter is negligible. These plants can withstand a considerable amount of drying out of the soil and are resistant to frost injury. Under favourable spring conditions they grow rapidly, and although they are not suitable as winter crops, it is considered possible that a method of using clovers sown in late winter to improve the humus and nitrogen content of the soil may yet be found.

Black Winter rye has several characteristics which make it superior in many respects to the various other cereals tested. This variety is highly resistant to frost and shows no sign of injury even when minimum grass temperatures fall as low as 10 deg. Fahr., except when in the flowering stage; the frosts in 1940 left the experimental crop unharmed. The plant is able to make a moderate amount of growth under very dry conditions, due no doubt to its extensive root system. It tends to run to stalk rather rapidly and should, therefore, be ploughed in at an early stage. If its moderate moisture requirements be satisfied the plant will continue to grow throughout the winter, and with a rapid increase of growth in early spring it will finally produce a large amount of green matter. The ability of the plant to withstand acid soil conditions and to make good growth in sandy soils is well marked. It is reported to make normal growth in soils which give rise to copper deficiency disorders in other plants (Riceman and Donald, 1939).* For these reasons rye is regarded as a very suitable cereal for green manurial purposes in the Stanthorpe district.

Wheat has not been used extensively in the experiments, but the available experimental and observational evidence suggests that, with suitable fertilizing and sufficient moisture, Florence wheat makes satisfactory growth as a winter crop, and is resistant to normal frosts. Wheat is, generally speaking, less tolerant to soil acidity than rye.

Barley has not given impressive results in field tests. It often shows unhealthy foliage colouration and lack of vigour under Stanthorpe winter conditions, and it seems to be more subject to disease, notably rust, than the other cereals tested. It is liable to injury by severe frosts. Barley is not very tolerant of acidity, and on this account local soils may impose a restriction on its growth.

Limited tests have shown that **Sunrise oats** may provide a good crop of green manure during winters in which abnormally severe frosts do not occur. Frosts developing at grass temperatures of about 15 deg. Fahr. and lower cause serious yellowing and subsequent death of much of the foliage, whereas under similar conditions rye is unaffected. Oats is recognised as a plant which tolerates soil acidity, and in this respect it compares favourably with rye and is to be preferred to barley.

GENERAL RECOMMENDATIONS.

The supplying of organic matter to Stanthorpe soils is of fundamental importance to the maintenance and improvement of soil fertility in the district and, therefore, it is recommended that green manuring be adopted as a routine practice in orchards, vineyards, and vegetable gardens. In this branch of farm work growers are urged to employ improved methods, for the sowing of untried varieties on unprepared and unfertilized land is certain to lead to the failure of the crop.

New Zealand blue lupins and Golden tares are legumes of outstanding merit for the Stanthorpe district. Lupins should be the first choice as they are quick-growing and best able to survive both frost and drought conditions, and in general they form an excellent type of green manure plant. A legume should not be judged on the growth made in the first

* Copper response on "Coasty" Calcareous Soils in South Australia. Riceman, D. S., and Donald C. M., Journal of Department of Agriculture, South Australia, Volume XLII., No. 11, 1939.

year of planting as two or three successive crops may be required before the variety reaches its maximum growth.

Black Winter rye is outstanding for its winter hardiness and drought-resisting qualities, and will generally make good growth as a winter crop. Sunrise oats and Florence wheat are in some respects also suitable varieties, but they are sometimes damaged by severe frosts. Cape barley is less satisfactory than the other cereals mentioned.

Seed should be sown in land which has been properly prepared by suitable cultivation. In the absence of a seed drill the seed should be buried, after broadcasting, preferably by means of a plough, rotary hoe, or cultivator, but harrows are fairly effective with most seeds. The recommended rates of seeding per acre are—(*a*) New Zealand blue lupins or Golden tares, 1 bushel for first one or two years, thereafter ¾ bushel; (*b*) Black Winter rye, Sunrise oats, or Florence wheat, 1 bushel.

The time of sowing is governed largely by autumn rainfall. Cultural preparations for the sowing of the crop should be made in March so that both soil and crop will benefit from any useful autumn rains. Early sowing is always preferable to late, as the plants should be well established before the approach of winter. Rye can be sown later than any of the other crops mentioned above.

Fertilizers should be broadcast and ploughed in in the course of the preparation of the seed-bed, and they can be applied advantageously one or two weeks before the seed is sown. Experience has shown that, although satisfactory results usually follow the simultaneous application of seed and fertilizer, fertilizers in close proximity to the seed may lower germination. The following rates of application per acre are recommended—(*a*) For legumes, 1½ cwt. sulphate of ammonia or 1¾ cwt. nitrate of soda together with 1 cwt. superphosphate in both cases; (*b*) for cereals, 1½ cwt. sulphate of ammonia or 1¾ cwt. nitrate of soda. Lower rates of application for both legumes and cereals can be used if the soil has recently received adequate nitrogenous fertilizers.

Unless the crop is turned under in good time the ratio of carbon to nitrogen in the plants becomes so wide, that is, the carbon content becomes large and the nitrogen content comparatively small that one of the important objects of green manuring, namely, increasing the amount of available nitrogen in spring, may be defeated. In cereals particularly the carbon-nitrogen ratio widens rapidly as the plants approach maturity, so that if a winter-grown crop is ploughed in after the seed-heads have begun to form, the amount of available nitrogen in the soil may temporarily be reduced at a time when the fruit trees particularly require that element. Such action is brought about by those soil bacteria which are largely responsible for decomposing the green manure crop, for they are forced to draw on the soil nitrogen for their energy requirements if they are unable to obtain it from the green manure crop itself. It is advisable, therefore, that green manure be turned under before the crop reaches the flowering stage and in time to allow of the decomposition of the plants, and the resultant liberation of nitrogen so that that element will be available when the trees require it in early spring. Young plants decompose more rapidly than mature ones, and legumes more rapidly than cereals and most other non-leguminous plants. As a general rule, non-leguminous crops (Plate 57) should be ploughed in six or seven weeks and legumes three or four weeks before the end of the dormant period of the crop plants they are intended to benefit.

SUMMARY.

The practice of green manuring is rendered difficult in the Stanthorpe fruitgrowing area by climatic and soil conditions. Limiting features of the climate are severe winter frosts and uncertain rainfall which frequently results in low soil moisture; whilst direct soil factors include unavailability of certain plant food elements and, to a less extent, soil acidity. Green manuring practices in local orchards and vineyards vary greatly, and adequate crops of green manure are not commonly produced.

Investigations were begun in 1937, firstly, to determine the fertilizer requirements of leguminous and cereal crops grown as winter green manure, and, secondly, to test potentially suitable green crop varieties. The results of four years' experimentation are reported.

Plate 57.

EFFECTIVE PLOUGHING-IN OF THE GREEN MANURE CROP ENSURES ITS RAPID DECAY.—Cereal crops should be turned under at least six weeks prior to the blossoming of the trees it is intended to benefit.

The fertilizer experiments with the legumes, lupins and field peas, have shown (1) that the yield of green matter is increased more by sulphate of ammonia and nitrate of soda than by superphosphate or sulphate of potash or any combination of the latter two; (2) that certain combinations of superphosphate and potash gave small but significant responses on peas, particularly when a nitrogenous fertilizer was included in the mixture. The results generally suggested that restrictions may be imposed on the growth of legumes not only by a shortage of nutritional elements, but also by other factors not yet fully determined.

Fertilizer experiments with cereals showed that nitrogenous fertilizers greatly improved the type of plant, and consistently caused striking increases in the quantity of green matter even in seasons of low rainfall. Phosphatic and potassic fertilizers gave no marked responses.

Various species of leguminous and cereal plants have been tested as winter green manure crops. New Zealand blue lupins and Golden tares are outstanding among the legumes for their ability to grow effectively despite severe frosts and periods of low rainfall. Dun field peas, commonly used in the district for green crops, are susceptible to injury from severe frosts, and seldom yield satisfactory amounts of green matter.

Of the cereals tested Black Winter rye proved the most outstanding in frost and drought resisting qualities. Sunrise oats showed that it could make extensive growth under normal winter conditions, but could not resist injury from the more severe frosts. Cape barley was the least satisfactory of the cereals.

General recommendations, based on experimental results and extensive observations, are given for green manuring in the Stanthorpe district.

MILLETS FOR FODDER PURPOSES.

The quickest growing fodder crops are the millets. Since the preparation of the land for winter cereals will probably be shallower than that necessary for maize and sorghums, millets should give the most profitable returns.

The millets—Japanese, white panicum, and giant setaria or giant panicum—are hardy plants and stand dry conditions well. They are quick growing and have supplied material for grazing within six weeks of planting. These plants, however, should not be grazed before the roots are sufficiently strong to avoid their being pulled up by stock; and where judiciously grazed under favourable weather conditions, a good ratoon crop can be expected of them.

Where the green feed is not needed millets make a good quality hay, if cut when the seed heads are formed and before the seed has developed. A delay in cutting occasions loss in several different ways, and it is better, if there is any doubt as to when the crop is to be cut, to err on the side of greenness rather than otherwise. If cut too green, the hay may cause a slight scouring of stock; but if it is too well matured a loss of digestible plant nutrients will result. Further, if such a free seeding crop is allowed to mature, the scattered grain will cause trouble in subsequent crops by the resultant volunteer growth, and the seed, if carried into the haystack or shed, provides food for mice.

With a desire to attain balance in their stock foods, farmers have successfully made light sowings of cowpeas with the millets for grazing purposes, thus increasing the protein content of their fodder and so improving their cream returns.

Millets also, especially in combination with coarse-stalked crops—such as maize and sorghum—make excellent silage; and since they produce 10 to 12 tons of green material to the acre under good conditions, they may be used most advantageously for that purpose.

Millets prefer a loam for maximum growth, but will grow on a wide range of soils; even poor lands if sufficient moisture is present will give payable yields. Early sowings can be made as soon as frosts are over and can be continued successfully until January and February. Only small areas should be planted in November and December to provide grazing, as the heavy summer rains in January are apt to prevent the harvesting of any surplus as hay.

For sowing 10 to 12 lb. of seed per acre are usually sufficient when broadcast and harrowed in. When sown for hay, or on rich soils, a heavier seeding (about 15 lb.) is frequently used with a view to producing a fine-stemmed crop. Too heavy a seeding (over 20 lb.), however, will not have this effect, since—especially during a short dry spell—the original stand is quickly reduced by competition sometimes even to meagre proportions.

Of the varieties white panicum is undoubtedly the most popular. A quick grower, it stools well and reaches a height of from 4 to 6 feet. It has a flat stem and makes a good bright hay of some commercial value. Japanese millet is slightly shorter in its mature growth, but is—especially in the earlier stages—an even quicker grower and heavier stooler than white panicum, and is most suitable for grazing. Giant setaria (or giant panicum) has also received some attention, and under favourable conditions good results are obtained. Under adverse conditions, however, it does not appear to give as good results as the other varieties.

The millets also are very useful in controlling summer weed growth, but, of course, should be taken out before the time arrives to begin preparing the land for autumn planting.

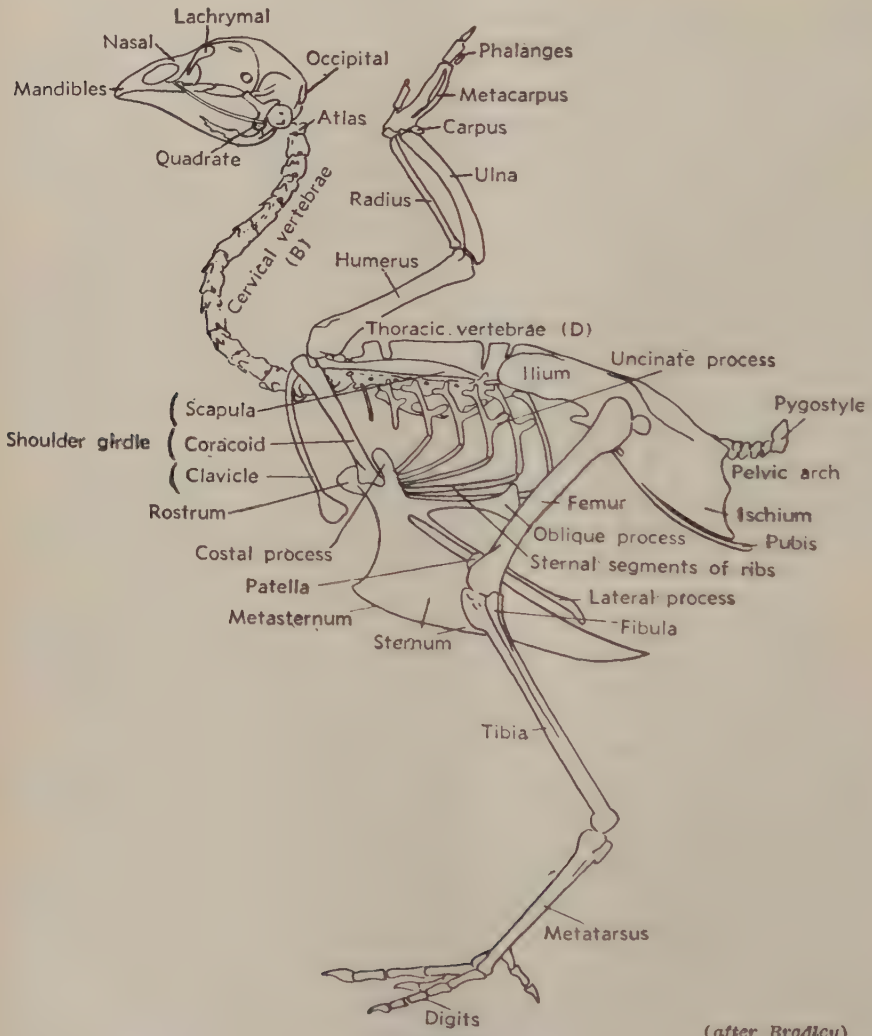
Poultry Farming in Queensland.

(*Continued from page* 116, *August*, 1941.)

THE STRUCTURE OF THE FOWL.

SKELETON.

Birds are vertebrates which are especially adapted for flying or running. Thus the forelimbs (the wings) and the hindlimbs (the legs) are not used simultaneously in progression, as occurs in most animals. The skeleton, as the framework upon which the muscles work, is specially modified to this end. In the flying birds there is great development of the forelimbs and attached muscles. In poultry, where the power of flight is largely lost, the forelimbs are comparatively weak and the hindlimbs relatively stronger.



(*after Bradley*)

Plate 58.
THE SKELETON OF THE FOWL.

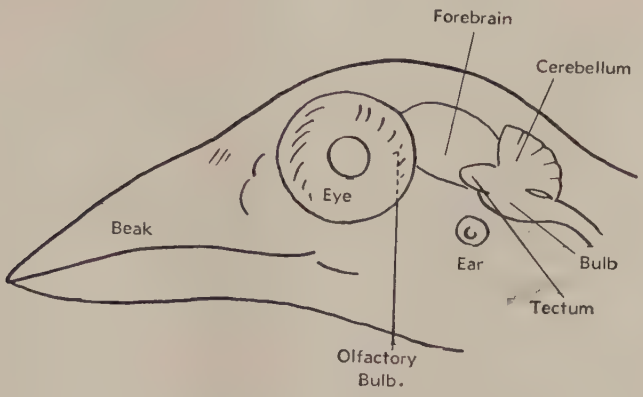
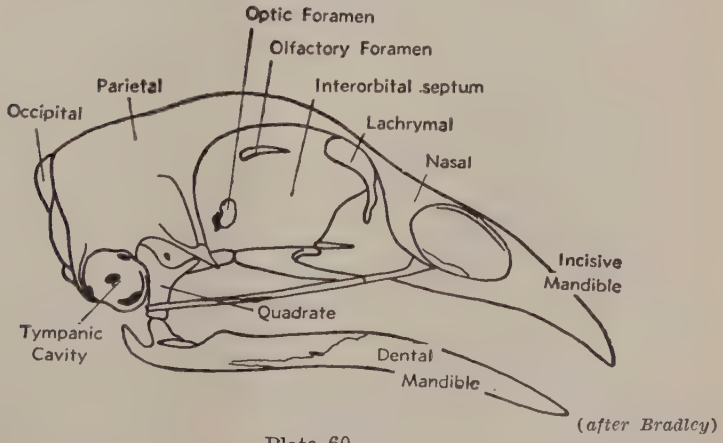


Plate 59.
THE SKULL AND BRAIN, SIDE VIEW.

In all poultry the skeleton is modified from that of other vertebrates in that—

1. The shoulder girdle consisting of the coracoid, clavicles and shoulder blade has been stiffened to make a firm fulcrum upon which the bases of the wing rest.
2. A keel for the attachment of large pectoral muscles has been developed along the sternum.
3. The bones are strong and light and contain air spaces which communicate with air sacs. These sacs are distributed in the dorsal part of the body, thus keeping the centre of gravity low, and contributing towards stability in flight.
4. The pelvic girdle (hip bone), composed of the ilium, ischum, and pubis, is incomplete ventrally to permit of the passage of the large size eggs through the genital passages.
5. And finally the vertebrae of the lumbo-sacral region are fused with the hip bones for increased rigidity. The air sacs not only contribute to stability, but also have a respiratory function. In the rumpless fowl the pygostyle and some of the coccygeal vertebrae are missing.



(*after Bradley*)

Plate 60.
THE SKULL.

The **Skull** consists of the following component parts:—

The *Lachyrmal Bone* forms part of the margin of each eye cavity.

The *Occipital Bone* forms the base of the skull and originally consists of four parts.

The *Quadrate Bone* is the bone between the lower jaw and the cranium (upper part of the skull), which permits of the mechanical movement of the mandibles.

The *Parietal Bones* are the pair of broad, short bones between the occipital and frontal bones.

The *Frontal Bones* are the large bones which can be divided into the frontal, nasal, and orbital parts.

The *Nasal Bone* is a thin plate notched at the opening of the nasal cavity; is one of the facial bones.

The *Optic Foramen* is the opening in the bone, through which the optic nerve (nerve to the eye) reaches the brain.

The *Olfactory Foramen* is a channel in the bones through which the nerve governing the sense of smell connects with the brain.

The *Tymphanic Cavity* is the cavity of the ear.

The *Interorbital Septum* is the inner partition between the orbital cavities.

Plate 59 indicates the situation within the skull, of the ear, eye, and brain.

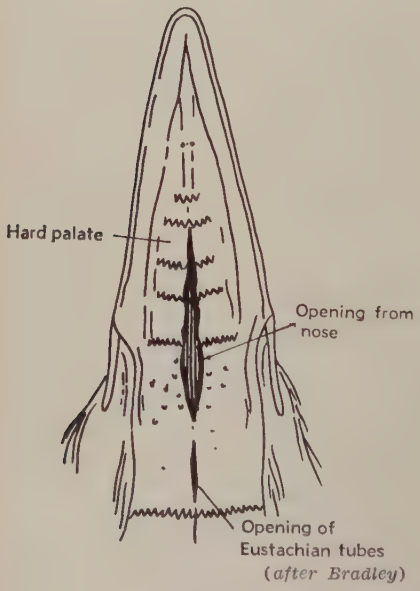


Plate 61.
ROOF OF THE MOUTH.

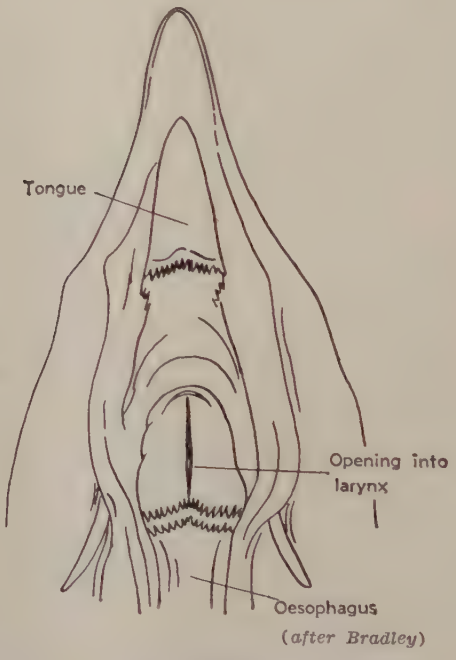


Plate 62.
FLOOR OF THE MOUTH.

The **Vertebral Column** is made up of the—

Cervical Vertebrae, consisting of the thirteen neck bones, of which the first is the *Atlas,* on which the skull rests. The atlas possesses a deep concavity which allows for the free movement of the skull.

Thoracic Vertebrae, seven in number, which carry the ribs. The second, third, fourth, and fifth bones of this section are fused together. The first two ribs are free, the others being attached by sternal segments (see Plate 58) to the sides of the sternum. The spread of the ribs has a direct relationship to the capacity of the lungs, heart, and liver.

Lumbar and Sacral Vertebrae, about fourteen in number, but merged into one bony mass.

Coccygeal Region, consisting of five or six bones, terminating in the pygostyle, the foundation of the tail.

The **Sternum** (breast bone).—This bone, in young birds, is most cartilaginous at the rear end. A serious fault is crookedness, which may be influenced by breeding, feeding, and perching. This bone articulates with the coracoid bone, and allows for the expansion of the abdomen when the bird is in production. The length of this bone is of considerable importance, as a long breast bone gives added support to the bird's abdomen and relieves the strain on the abdominal muscles. It is frequently found that the abdomens of birds with short breast bones sag, due to a rupture of the abdominal muscles.

The **Pelvic Arch.**—This consists of the ilium, ischium, and pubis. The *Ilium* is the largest of the section and is fused with that part of the vertebral column which contains the last thoracic, the lumbar, and sacral vertebrae. The inner surface provides the deep cavity in which the kidneys are lodged. The *Ischium* is much smaller than the *ilium.* The *Pubis* is the thin, narrow strip of bone running along the border of the *ischium,* being free at the lateral end. In young stock this lateral section is very easily injured in handling.

The pubic bones, when a bird is in production, are wide apart, but when not in lay they come much closer together at the free end. The distance between the tip of the sternum and the pelvic girdle is considered to some extent a measure of egg-laying capacity.

THE SKIN AND FEATHERS.

The skin is thin and contains no sweat glands, but over the base of the tail is a single oil gland, whose secretion the fowl uses when preening its feathers. The skin is divided into ten areas which grow feathers, called feather tracts or *pterylae.* The remaining spaces are devoid of feathers and are called *apteria.*

The feather tracts are situated as follows:—

1. Shoulder (humeral tract).
2. Thigh (femoral tract).
3. Rump (caudal tract).
4. Breast (pectoral or lateral tract).
5. Neck (cervical or anterior spinal tract).

6. Abdomen (ventral or inferior tract).
7. Leg (crural tract).
8. Back (dorsal or posterior spinal tract).
9. Wing coverts (alar tract).
10. Head (caput or head tract).

The colour of the skin varies from white to yellow, the latter being due to the presence of a fat pigment (lipochrome). The silkie appears to have a dark skin, but this is in reality due to the dark colour of the underlying tissues. In white-skinned breeds the bottoms of the feet are white and in yellow-skinned breeds yellow. Numerous nerve endings in it make the skin very sensitive, but the blood supply to it is small.

On the head the skin develops into special forms, e.g., the comb and wattles and ear lobes. The scales on the legs and feet, the toenails, and the horny covering of the spur are also derived from the skin.

Heat Regulation.—The body temperature of the fowl is higher than that of other animals, and more variable, with a daily range of from 105 deg. F. to 109·4 deg. F. The skin and feathers prevent undue heat loss. The skin itself, with its subcutaneous fat, acts as a sort of blanket and, in addition, the feathers prevent the cooling effect of air currents by the creation of a zone of still air imprisoned in their interstices. This protective area can be thickened at will when the fowl fluffs up its feathers, thus deepening the zone of still air surrounding the body.

Protective.—Skin and feathers protect the underlying tissues mechanically. The skin also is impervious to some liquids and gases that otherwise would be harmful and the feathers prevent direct moisture and sunshine from reaching the skin.

Sensory.—By its numerous nerve endings the skin supplies rapid information of change in its environment, e.g., temperature, pain, and enables the bird to make the necessary response, e.g., movement.

In addition, of course, the feathers assist in both flight and running, and by their diversified colouring and shape supply the external differences between the sexes. When it is considered that the whole feather covering is changed yearly and that it represents 4 to 9 per cent. of the body weight, it is apparent that it is an important item in the bird's annual production.

Feathers are the most important of the specialized skin structures. As well as protecting the bird they help to maintain the body temperature and are essential to flight.

A typical feather consists of a shaft (axis or scapus) and a web (vane or vexillum). Each feather grows from a papilla on the skin and is capable of being raised or lowered by small muscles attached to the base.

The free part of the shaft is the quill, and that supporting the web the rhachis. The quill is hollow and the rhachis solid and four-sided, tapering, and pliant. The web is made up of slender vanes (barbs) set obliquely to the rhachis. Each interlocks with its neighbours by means of slender barbules on each side. The edges of the barbules are provided with minute hooks which interlock with one another. By this means the web becomes matted into a continuous sheet capable of withstanding the pressure of the air in flight. Feathers, other than the true tail feathers and the primaries and secondaries of the wing, are considerably modified

to adapt themselves to the various parts of the body they cover. The down feathers have no barbules for interlocking. A flight feather, with a web 6 inches long, has some 1,200 barbs and about 1,000,000 barbules, besides an immense number of the microscopic hooks which are attached to each barbule.

MUSCULAR SYSTEM.

The flesh of poultry is composed of *voluntary muscles* similar to but paler in colour than those of the ox and sheep. The internal organs contain small quantities of *involuntary muscles,* so called because they are automatic in action and not under the direct control of the will. The *heart muscle* is a special sort of involuntary muscle.

The voluntary muscles do the active work of the body and are attached at one end—called the *origin*—to the central framework of the skeleton and thence run outwards to be attached by tendons, or directly to the bones they are to move. (This end is called the *insertion.*) Where tendons run over joints or bones they are held in position by bands of fibrous tissue or ligaments.

The *Diaphragm.*—This muscular partition between the chest and abdomen of mammals is almost entirely absent in poultry.

The *Pectoral Muscle* is the largest of the body and, with the smaller supracoracoid underlying it, makes up the breast of the fowl and is equal in weight to all the remaining muscles. The *origin* is the sternum and adjacent parts, and *insertion* is in the humerus, near the shoulder joint. The *action* of the pectoral muscle is to depress the wing in flight; hence the necessity for its great size, even in those birds which no longer fly but still use their wings in fighting and running.

The *Supracoracoid Muscle* has its origin in that part of the sternum which is not occupied by the pectoral muscle. The *insertion* is by means of a rounded tendon through the shoulder joint to a point opposite the insertion of the pectoral muscle on to the humerus. The *action* is opposed to that of the pectoral muscle—*i.e.,* it raises the wing in flight.

The *Ptagium* is a fold of skin stretching between the ribs and the arm and forearm. It contains elastic fibres and muscles and assists in folding the wing.

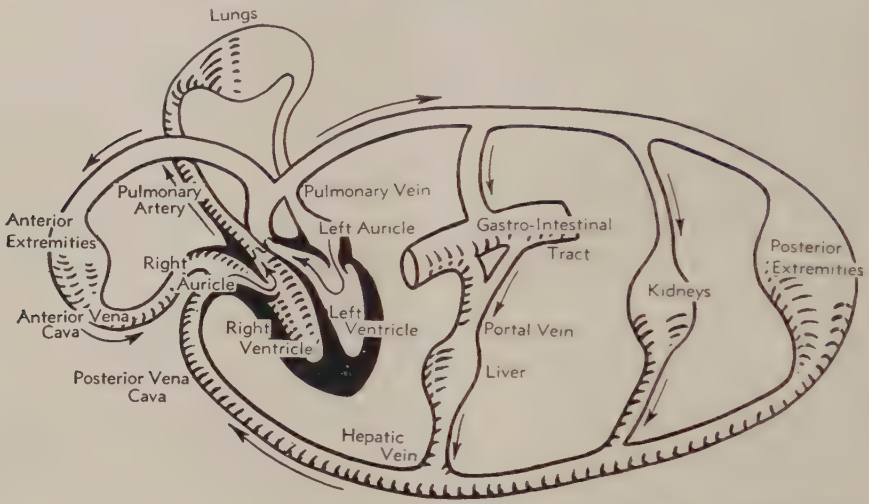
The leg muscles are small and numerous. Their tendons often become ossified in old birds and hence are best removed when dressing poultry for the table. Bending of the joints of the legs, as in perching, causes the toes also to flex, due to a pulley-like action of the long tendons over the tibio metatarsal joint, thus maintaining the grip during sleep.

The involuntary muscles are small in bulk but widespread throughout the body, occurring in the walls of hollow organs, such as blood vessels and stomach, intestines, &c. Their functions are automatic and consist in maintaining the continuous processes of digestion, circulation, excretion, and so on of the healthy body.

THE CIRCULATORY SYSTEM.

The circulatory system consists of the heart, arteries, veins, and blood. The heart is a muscular pump supplied with valves, which sends the blood in a continuous stream throughout the arteries to all parts of

the body. Thence it is returned by thin-walled tubes (the veins) to the heart. The arteries have thicker walls than the veins as they contain elastic and muscle fibres. The heart is relatively large. It is enclosed in a membrane—the pericardium—and is situated between the lobes of the liver. Communication takes place between the terminations of the arteries and veins by hair-like tubes called capillaries. The chief vessels leaving the heart may be seen in Plate 64.



(after drawing in "The Physiology of Domestic Animals" by H. H. Dukes, D.V.M., M.S.)

Plate 63.
THE CIRCULATORY SYSTEM.

The blood consists of the following elements:—

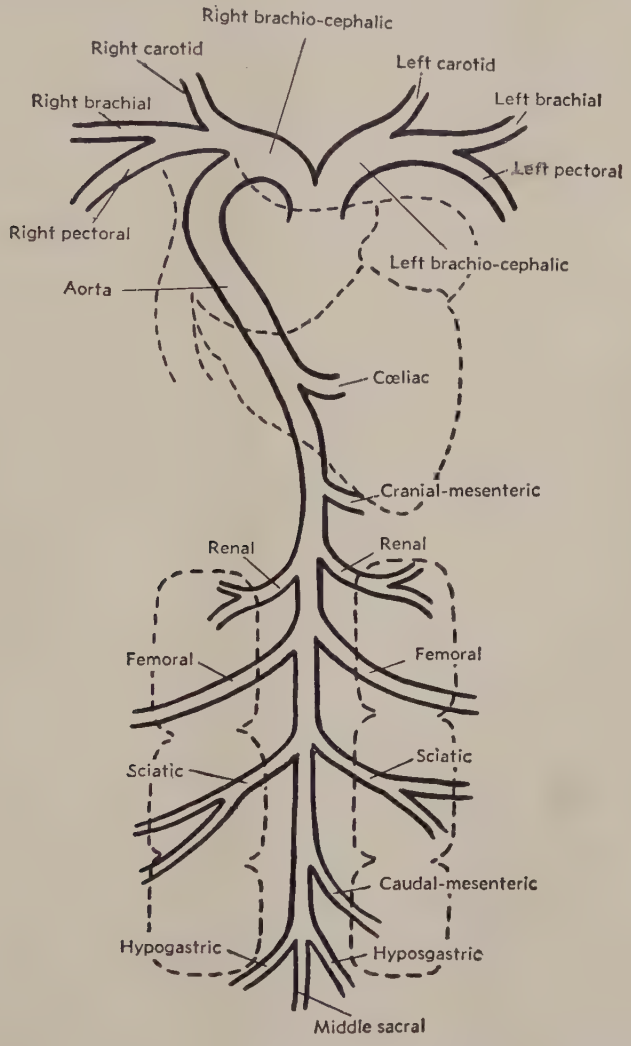
Plasma.—A pale fluid, which conveys the red and white cells;

Red Cells.—(Erythrocytes) which contain a red pigment called haemoglobin, and are carriers of oxygen;

White Cells.—Fewer and larger than the red cells. They have the power of destroying injurious invaders of the blood.

The function of the circulatory system is to supply freshly oxygenated blood to all parts of the body. In addition to oxygen the blood contains nutrient substances in soluble form for the nourishment of the tissues. The venous blood on its return carries waste products and burned oxygen in the form of carbon dioxide for excretion through the lungs. If reference is made to Plate 63 it will be seen that freshly oxygenated blood reaches the left side of the heart by the pulmonary arteries. From that it is pumped along the great vessels to reach the most distant parts of the body. In the digestive tract it receives nutrients which are delivered to the liver, where they are purified and made more assimilable, and thence reaches the venous stream and the right side of the heart. In the kidney certain waste products are collected and discharged through the ureters. All returning venous blood enters the right side, and from there passes to the lungs, where oxygen is received and moisture and carbon dioxide is given off. From the lungs the purified blood bearing its load of nutrients returns to the left side of the heart, thus completing the cycle.

The heart is composed of cardiac muscle, and is under involuntary nervous control. It contracts at a very rapid rate—normally about 300 beats per minute.



(*after Bradley*)

Plate 64.
Diagram of Chief Arteries.

RESPIRATORY SYSTEM.

The respiratory organs consist of the nostrils, glottis, upper or superior larynx, the trachea, the lower larynx or syrinx, the bronchi, air sacs, and the lungs.

Nostrils are small openings at the base of—and on both sides of—the beak, connected to the opening (slit) in the roof of the mouth.

Larynx.—The larynxes are valves at both ends of the trachea, known as the *upper,* situated near the base of the tongue, and the *lower,* situated

at the junction of the trachea and bronchi. The lower is at times termed the *syrinx,* or true larynx, by virtue of its being provided with vocal cords. The upper is much larger than the trachea, it being a very hard, cartilaginous or bony structure and operated by strong muscles. The lower larynx is of cartilage and is flattened.

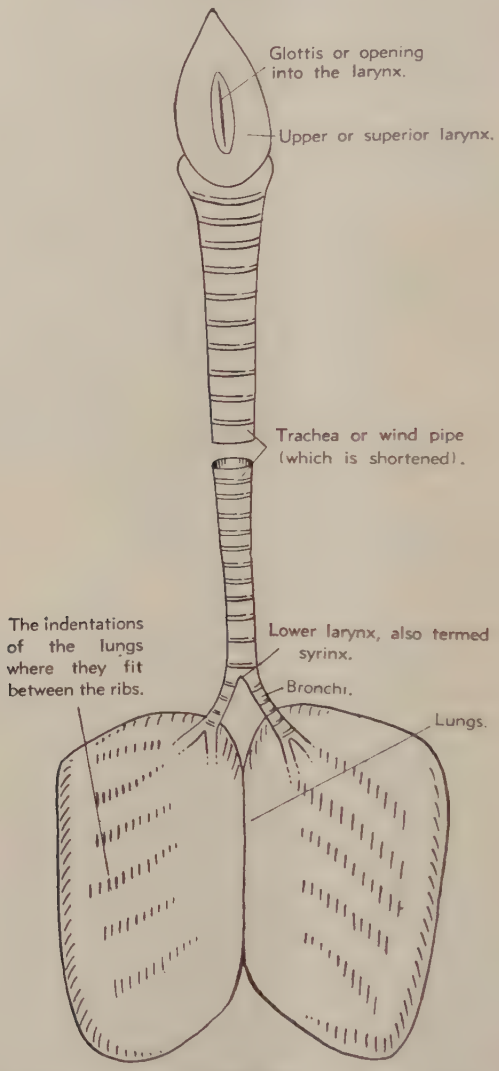


Plate 65.

ORGANS OF RESPIRATION.—An Explanation of the Trachea and Lungs.

Trachea.—Commonly known as the windpipe, made up of numerous round rings of cartilage joined by narrow membranous ligaments.

Bronchi.—The trachea divides at the lower larynx into two tubes known as bronchi, one going to each lung.

Bronchioles are further subdivisions of the bronchi, which form into air cells of the lungs. Other bronchial tubes supply air to the air sacs of the body.

Air Sacs.—These are nine in number, communicating with the bones of the limbs and body on the one hand and with the bronchi on the other. They confer lightness and buoyancy to the body. The air sacs are named as follows:—

A single *clavicular* sac, placed behind the clavicle bone and continued on each side as an *axillary* sac, which supplies air to the sternum, sternal ribs, shoulder girdle, and humerus.

Above and behind the clavicular sac are two *cervical* sacs, which supply air to the thoracic vertebrae.

Then there are two *thoracic* sacs, which do not supply air to any bones.

Encasing the abdominal organs are two large *abdominal* sacs, which supply air to the sacrum, hip bone, and femur.

Air sacs are developed to a greater degree in flying and water fowls than in running birds.

Lungs.—The lungs, bright-pink and sponge-like, are applied closely to the under side of the back. They reach from the first rib in front to the kidneys behind. They are composed of air cells lined with a thin membrane and richly supplied with blood. Through this membrane takes place the interchange of gases between the blood and the inspired air, which gives fresh oxygen to the blood and removes the used-up air in the form of carbon doixide. The air cells are supported in a sort of elastic network.

The respiratory system of birds differs greatly from that of other animals; the lungs are small and the bony wall surrounding them cannot expand, so that the active part of breathing is *expiration* and not *inspiration,* as in man. The air sacs are peculiar to birds, and with the hollow bones form an extensive reservoir of air in communication with the lungs.

In breathing, air is drawn through the nostrils and enters the mouth through the slit in the hard palate. Thence it passes through the cranial larynx down the trachea to the syrinx, which is the true sound-producing organ. The bronchi conduct the air from here to the lungs.

Through the thin membrane lining the air cells fresh oxygen passes to the blood, and from it moisture and carbon dioxide pass to the air cells and are exhaled through the contraction of the involuntary muscles, which form part of the framework of the lungs. The lungs are restored to their former size after breathing out by their elastic fibres, and so the process is repeated.

Birds may occasionally breathe through the open mandibles, but it is generally a symptom of some obstruction of the respiratory tract or else because of very hot weather and an endeavour to increase the rate of cooling of the body.

THE DIGESTIVE SYSTEM.

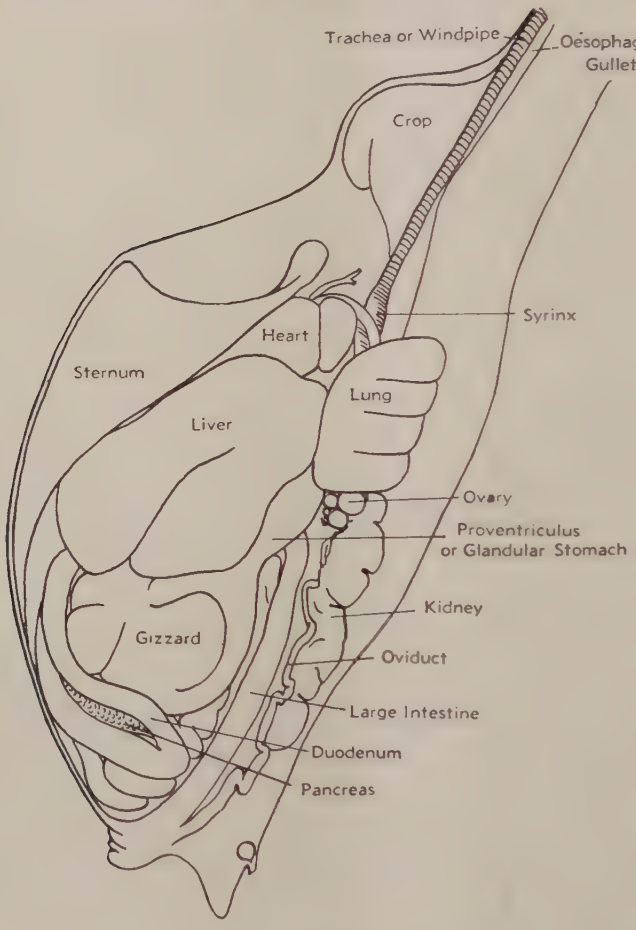
The digestive system consists of the following organs:—

Mouth.—Containing the tongue and the glands, which supply moisture to enable the bird to swallow food.

Tongue.—Narrow and pointed. The tip is horny and the rear part carries a transverse row of simple, large, and horny papilla (a nipple-like protuberance) directed towards the gullet. There are also similar papilla on the roof of the mouth.

Oesophagus.—Is the tube leading from the mouth to the proventriculus, interrupted by the distension known as the crop. The oesophagus is frequently termed the gullet.

Crop.—The food reservoir formed by a one-sided distension of the oesophagus, situated in front of the base of the neck and lying to the right. The crop may contain, with comfort, from 4 to 6 oz. of food, due to the elasticity of its walls. From the mouth to the crop there are numerous glands secreting juices which, while not of a digestive nature, tend to moisten and soften the food. The crop itself is glandless.



(*after Bradley*)

Plate 66.
THORACIC OR ABDOMINAL VISCERA.

Proventriculus.—Commences about 2 inches to 3 inches from the crop and extending to the gizzard. It is enlarged, being about $\frac{3}{4}$ inch in diameter, and is from $1\frac{1}{2}$ inches to 2 inches in length; the walls are thickened and on the inner lining there are a large number of glands; it is also called the glandular stomach.

Gizzard.—The largest single organ of a fowl, located next to the proventriculus; of great muscular strength, reddish in colour, of uneven

shape. The inner lining is thick and horny and raised into ridges. Grit is collected in this organ to aid in the crushing and grinding of food.

Liver.—Is the largest gland in the body and consists of two lobes —right and left—more or less flat, very thin at the edges. It is situated behind and below the heart and is reddish-brown in colour.

Gall Bladder.—Is attached to the liver between its two lobes and is an elongated, greenish organ. Two ducts carry bile from it into the duodenum.

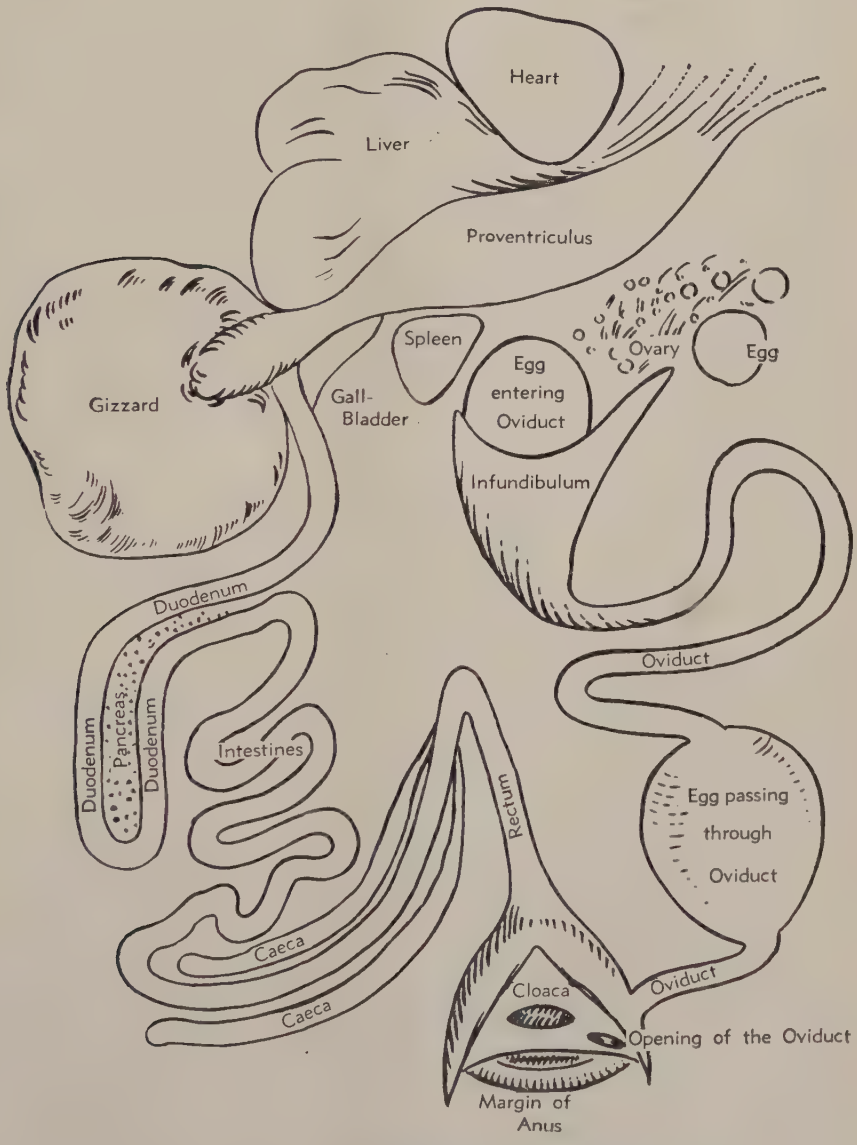


Plate 67.

ORGANS OF DIGESTION AND REPRODUCTION.

Pancreas.—A long, creamy-white coloured organ about 5 inches in length, suspended in the loop of the duodenum. Several ducts carry its secretion into the duodenum.

Mesentery.—A thin membrane attached to the small intestines, containing lymphatic and blood vessels.

Duodenum.—The first portion of the small intestines, attached to the gizzard. It is in the form of a loop, which supports the pancreas.

Jejunum and Ileum.—That portion of the intestines from the duodenum to the junction of the caeca.

The whole length of the small intestine is lined with intestinal glands, which secrete digestive juices.

Caeca.—The two tubes situated at the junction of the small and large intestines; these are 5 inches to 7 inches long, often referred to as "blind guts."

Large Intestine.—Is very short, slightly thicker in diameter than the small intestine. It continues in a straight line from the small intestine as the *colon* to the *rectum* and terminates in the *cloaca*.

Cloaca.—Is the terminal dilation of the large intestines and is common to the digestive, reproductive, and urinary organs. It, therefore, has the following important functions to perform:—To receive and excrete the undigested food and waste products from the kidneys; the passage of eggs; and the reception of sperm from the cock in copulation.

Vent.—The exit of the cloaca.

Before food can be digested it must be broken down into small fragments, and, as the fowl does not possess teeth, this function is performed by the gizzard, which uses its gritty contents as a sort of mill. Were it not for this, the tough covering of the various grains which are swallowed whole by the fowl would prevent their digestion by the secretion of the digestive organs.

These secretions are prepared by different parts of the digestive tract, beginning with the mouth. Their function is to convert the non-digestible foodstuffs into digestible particles, which can be absorbed into the blood-stream through the innumerable, fine, hair-like villi that line the small intestine.

Of the food entering the fowl, some is used for supplying energy, some for growth and maintenance, some for production—*e.g.*, eggs and feathers—some is stored in the muscles, liver, and fat, and the balance—mostly consisting of indigestible substances, such as fibre—excreted as waste. If the crop and gizzard are empty, as when the bird has not been fed for some hours—the first food seized passes directly to the gizzard in about thirty seconds. If the gizzard is occupied with grinding, food is stored in the crop and passes onward only as required. This mode of entry is a means of protection, a legacy from a wild ancestor, enabling the bird to fill the crop rapidly on the ground and then return to a tree to digest it in safety.

To reach the gizzard food must pass through the proventriculus, but stays there only a few seconds.

After being ground in the gizzard, the food reaches the small intestine and passes slowly along it by means of rhythmical contractions of

its walls. The two blind caeca at its junction with the large intestine also contract and expand and seem to increase the fluidity, so that the contents pass easily to the cloaca where they accumulate and are ejected from time to time. In the laying hen, from the time food is picked up approximately two and a-half hours is needed for its unabsorbed portion to reach the cloaca. In the non-laying hen, this period is increased to about eight hours and in the broody hen is longer still, being in the neighbourhood of twelve hours.

Below are summarized the processes taking place in the different parts of the digestive tract—

Mouth and Gullet.—The ferment ptyalin begins the conversion of starches into maltose;

Crop.—The conversion of starch is continued;

Proventriculus.—The ferment pepsin begins the conversion of proteins into simple forms;

Gizzard.—All the above processes are continued during the grinding;

Small Intestine.—A number of secretions from the pancreas and small intestine itself complete the conversion of starches and proteins into available forms—*i.e.*, glucose and amino acids and also change fats, which have reached here largely unchanged, into available fatty acids.

Absorption of these available forms then takes place through the villi that line the small intestine, and the waste products pass to the exterior via the large intestine and cloaca.

Digestion is rarely complete, and absorption still less so, especially when overfeeding is associated with lack of exercise or the food ration is an unbalanced one, or when both these conditions occur simultaneously.

URINARY SYSTEM.

The two *kidneys* are closely applied to the dorsal wall of the abdomen behind the lungs. Each is divided into three or four lobes and is joined to an opening in the cloaca by a comparatively straight tube—the *ureter*. The substance of the kidney is formed of numerous fine tubules, whose ducts coalesce to discharge their contents into the ureters and by this means reach the cloaca. The kidney is very richly supplied with blood.

Certain waste products are collected from the blood-stream by the kidneys and excreted with the cloacal contents as a whitish, pasty mass, which is the equivalent of urine in other animals.

THE REPRODUCTIVE AND GENITAL ORGANS.

Female.—Only the left ovary and oviduct reach maturity, though both right and left are present in the embryo.

The ovary lies below the front half of the kidneys. It is composed of a number of rounded, yellowish bodies (ova) in different stages of development. If examined in the laying season there will be all stages up to that in which the ripe ovum—the yolk of the completed egg—is ready to be released into the oviduct.

Each ovum is surrounded by its own vitelline membrane and is attached to the ovary by a thin membranous envelope—the follicle. The whole ovary is so surrounded by other organs as to be in a sort of pocket —the only escape from which is through the expanded end of the oviduct—the *infundibulum.*

There may be 3,000 or 4,000 ova present in the ovary at one time.

The oviduct is a coiled tube extending from the infundibulum, in the vicinity of the ovary, to its opening into the cloaca. It is of varying diameter, and may be divided into five parts, some of which secrete the albumen, membranes, and shell which are necessary to complete the egg.

These parts are named as below:—

(1) Infundibulum—approximate length, 2 inches.
(2) Magnum—approximate length, 14 inches.
(3) Isthmus—approximate length, 4 inches.
(4) Uterus—approximate length, 5 inches.
(5) Vagina—approximate length, 5 inches.

The oviduct is supported by membranous dorsal and ventral ligaments. Its wall contains muscular tissue, which increases towards the cloacal termination, and is greatest in the walls of the uterus. The magnum, isthmus, and uterus contain glands which secrete the albumen (white) shell, membrane, and shell, respectively, during its passage to the exterior. In a non-laying hen the oviduct may be only 4 inches long and $\frac{1}{4}$ inch wide, whereas in full lay it may increase to 20 inches in length, with corresponding breadth.

The functioning ovary contains ova at all stages from the microscopic to the rounded yellow "yolk" ready to be fertilized, and about to be released into the infundibulum.

This release is effected by rupture of the fine membrane—the follicle—investing it.

Once received into the beginning of the oviduct, the ovum is surrounded by fluids containing innumerable spermatozoa. Several of these may pierce the germ spot, but only one unites with the female cell contained in it to form the fertilized cell from which the chicken will develop.

Progress down the oviduct is maintained by wave-like contractions of the muscular wall. The whole time spent in the oviduct is about twenty-five hours, as shown in the table below:—

Section of oviduct	Process occurring	Time spent
Infundibulum	Fertilization	approx. $\frac{1}{2}$ hours
Magnum	Deposition of thick albumen ..	" 3 "
Isthmus	Formation of shell membranes ..	" $1\frac{1}{4}$ "
Uterus	Formation of thin albumen and deposition of shell	" $20\frac{1}{2}$ "
		25

The egg passes to the vagina from the uterus when it is ready for laying, and normally its stay there is only a matter of minutes.

As a rule, ovulation—that is, the release of the next yolk into the mouth of the oviduct—follows the laying of the egg at an interval of about half an hour.

In the magnum, which comprises about half the length of the oviduct, the thick albumen is deposited on the yolk. It equals about half the total "white" of the completed egg, and can be plainly seen in a fresh egg broken into a dish as it stands up as a sort of plateau around the yolk, while the thin albumen flows around its base in a thin sheet. In stale eggs this differentiation is not noticeable.

In the Isthmus the shell membranes are formed. They are loosely applied, as they must leave room for the balance of the white which is to come.

In the Uterus the secretion of the thin white through the porous shell membranes, and the deposition of the shell, take place simultaneously in the early stages. The secretion of the thin albumen—some 40-50 per cent. of the total "white"—occurs in the first few hours, and the balance of the twenty odd hours spent here suffice to complete the shell ready for laying.

Male.—The two testes each have a tube—the deferent duct—leading to a small eminence on the wall of the cloaca. They are egg-shaped bodies placed ventral and anterior to the kidneys. The left is often larger than the right, and their size increases during the breeding season. The medial border of each is slightly concave. From this arises the "deferent" duct, which pursues a wavy course lateral to the ureter to open into the cloaca, on a small papilla.

Each testis is composed of much-coiled tubes—the seminiferous tubules—lined with epithelium from which the sperms are derived.

The male reproductive cells—spermatozoa—produced in the testis become motile in the deferent duct. Each duct terminates on a papilla on the dorsal wall of the cloaca, and is capable of injecting a large number—up to several million male cells—into the cloaca of the female during copulation. These spermatozoa then pass up the oviduct and occupy the infundibulum when the ovum is engulfed in it after ovulation. Only one of the male cells penetrates the germ spot and unites with it to form the fertilized ovum, from which will develop the chicken.

Male cells can live for about ten days in the oviduct, but then rapidly disappear, though fertile eggs have been obtained twenty-one days after the last mating.

The male cells, although microscopic in size, resemble a tadpole in appearance, and their long motile tail enables them to progress up the oviduct so rapidly that a fertile egg may be obtained twenty-four hours after mating. But in practice five-seven days is allowed before a high percentage of fertile eggs may be counted on.

THE EGG.

The shell consists of three layers and is porous. Externally is a delicate membrane, the shell cuticle or *bloom*. Beneath this is a spongy layer of calcareous fibres, and beneath this again is the *mammillary layer* consisting of conical masses of calcareous material, with air spaces between them.

The shell membrane lies between the shell and the white. It consists of two layers, which are closely applied to the shell and to one another, except at the large end, where they separate to form a space of variable size—the *air chamber.*

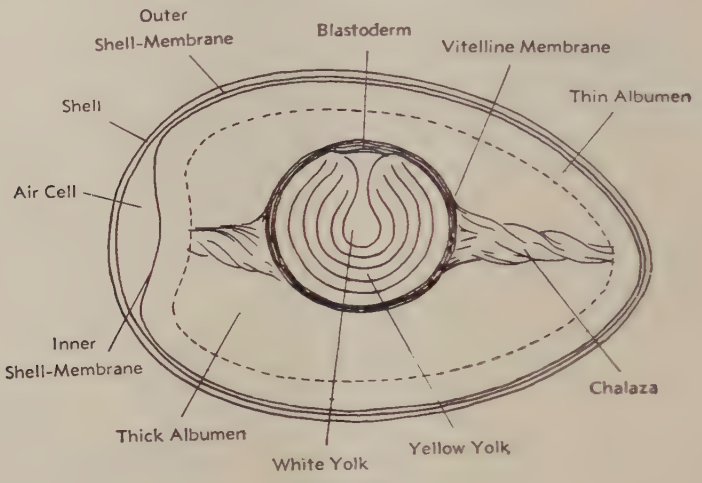


Plate 68.
THE EGG.

The albumen or white of the egg occupies the space between the shell membranes and central rounded yolk. Two cord-like thickenings of albumen arranged about the long axis and attached to the vitelline membrane are called the *chalazae.* About half of the white is formed of dense albumen surrounding the yolk and chalazae. Outside this is a more fluid layer, constituting the balance of the albumen.

The *yolk* is surrounded by its vitelline membrane. It is spherical, and composed of yellow and white material. The latter is arranged as a central flask-shaped mass and thin concentric layers separating thick layers of yellow yolk. A disc-like pale patch, about three-sixteenths inch in diameter on the yolk, is the *blastoderm*, or germ spot, a group of cells from which the chicken develops in incubation. In whatever position the egg is placed, this area is found at the top.

ENDOCRINE GLANDS.

These glands have no ducts of their own, but are usually well supplied with blood, and by this means their secretions reach the main blood streams.

They have a profound effect on the appearance and function of the bird. An example of this is seen in the cockerel whose testes are removed, resulting in the loss of most of the male characteristics. Their secretions are called hormones. They are essential to the normal function of all animals. The chief ones in the fowl are—

The testes—already described.

The ovary—already described.

The thyroid.—This gland is composed of small oval paired bodies located just within the thorax close to the jugular veins.

The spleen is a small, reddish-brown, rounded organ lying immediately to the right of the junction of the gizzard and true stomach. It is very richly supplied with blood by the splenic artery.

The thymus.—A lobulated body extending the length of the neck. It is only well developed in chickens and diminishes in size with age.

The adrenals are paired oval bodies about ½ inch long, lying medial to the anterior lobe of the kidneys.

The hypophysis or pituitary body is a small rounded mass attached to the base of the brain by a hollow stalk.

(TO BE CONTINUED.)

FOR ANGLE POSTS.

"The correct manner to stay an angle post is that adopted by the Post and Telegraph Department and the electric power boards. They have a far greater

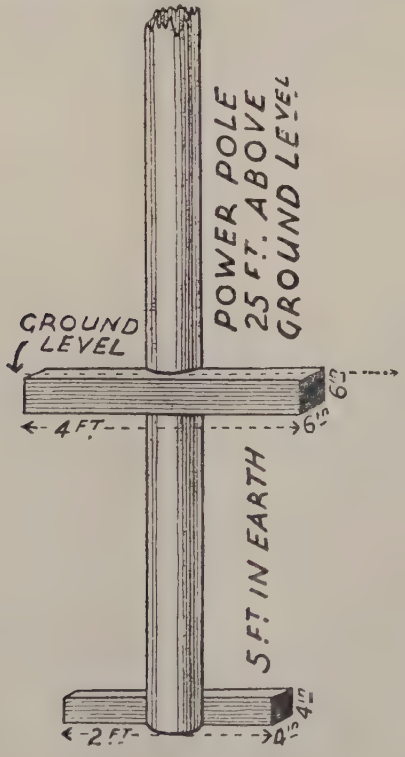


Plate 69.

leverage on a 30-foot power pole than a 4-foot fencing post, and they don't use a stay or strut. The sketch illustrates the method used."—"Ponga," in *The New Zealand Farmer Weekly.*

Seed Treatment of Sorghums.

R. B. MORWOOD, M.Sc., Research Officer.

WITH the recent increase in the popularity of sorghums as a crop, both for fodder and grain purposes, greater attention has been drawn to their diseases. One of these—covered kernel smut caused by the fungus *Sphacelotheca sorghi*—appears to be on the increase. While no great loss has yet been reported due to this disease, it is as well to take precautionary measures before such occurs. Accordingly, an experiment was laid out in the 1940-41 season to test the standard seed dust treatments on sorghum seed. The variety Wheatland Milo was used, the seed being first heavily dusted with spores from a mixed collection of smutted sorghum heads made the previous season. Five different dust treatments were carried out on samples of the smutty seed, and, together with an untreated control, they were planted in plots of two rows half a chain long. The plots were randomised and replicated four times. The dusts were applied at the rate of 2 oz. per bushel.

Results were obtained by counting the total heads and the smutted heads in each plot. The average percentage of infected heads for each treatment is given in the following table:—

TABLE I.

Treatment.	Percentage Infected Heads.	Significantly Better than—
(1) Copper carbonate	0·4	4–5–6
(2) Mercurial dust A	0·4	4–5–6
(3) Mercurial dust B	0·8	4–5–6
(4) Cuprous oxide	2·8	5–6
(5) Mercurial dust C	9·0	..
(6) Nil	10·8	..

The three leading dust treatments are considered to be effective measures for the control of the disease, and if they are used by farmers planting sorghums this crop should soon be free from smut. The two effective mercurial dusts are the only two in common use on wheat and other seed in Queensland being Agrosan and Ceresan. The choice of either of these or of any reliable brand of copper carbonate rests with the farmer concerned.

Summary.

Sorghum smut has become somewhat prevalent in this State, but it can be controlled by the dust seed treatments which are used for covered smut of wheat.

The Brisbane Exhibition.

Plate 70.
The Grand Parade.

Plate 71.
Another Section of Brisbane's Picturesque Show Arena.

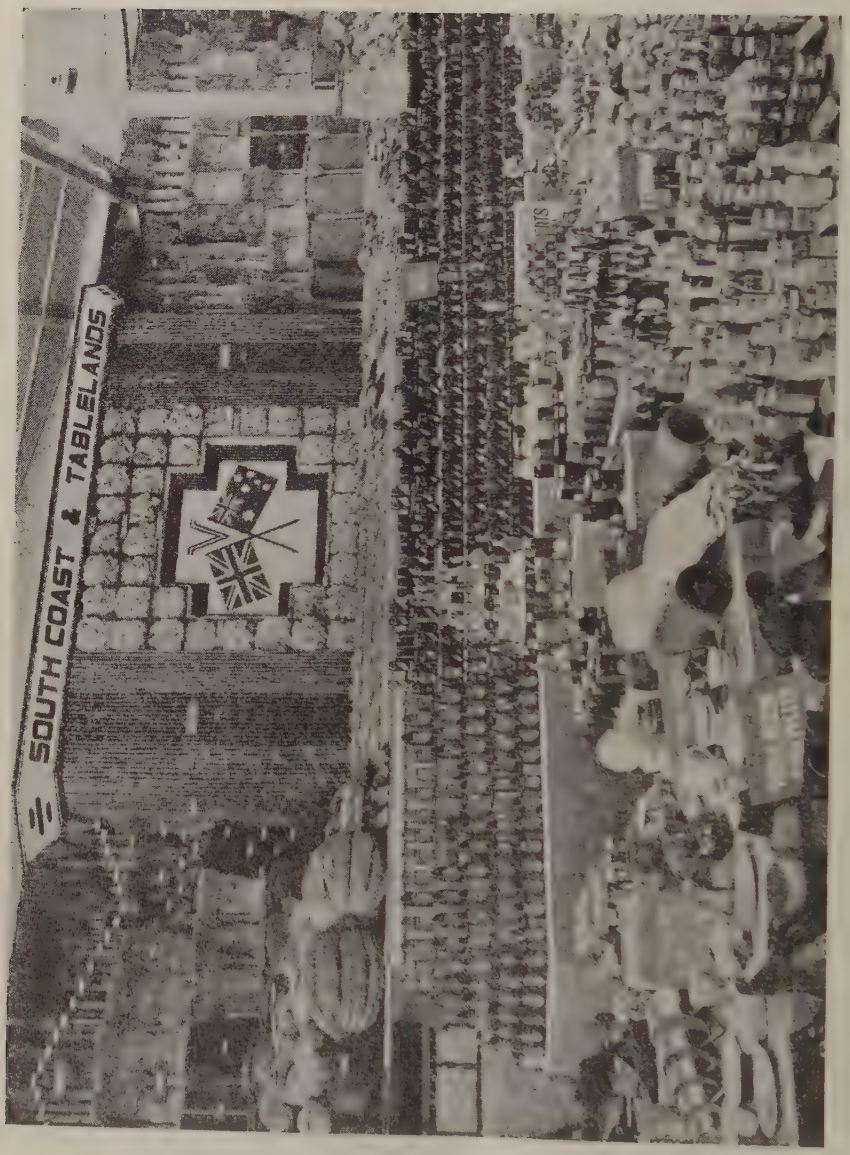


Plate 72.
THE WINNING "A" GRADE DISTRICT EXHIBIT.

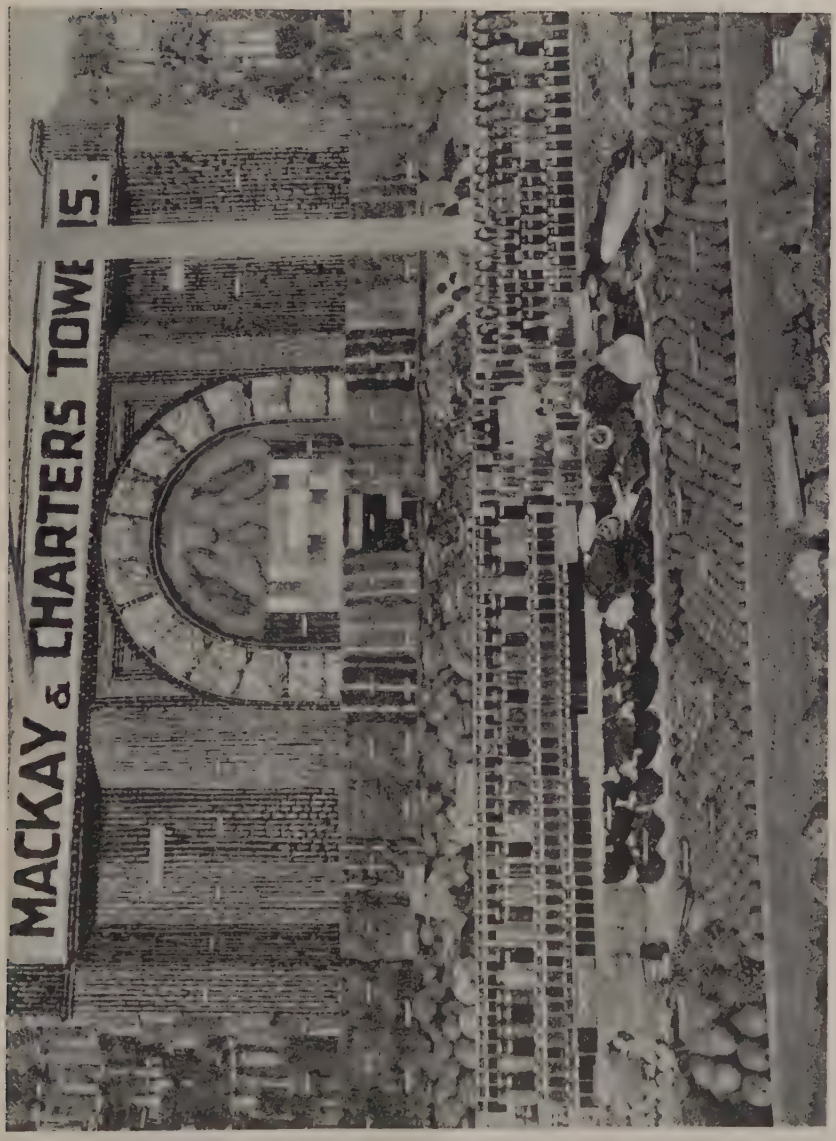


Plate 73.
The Winning "B" Grade District Exhibit.

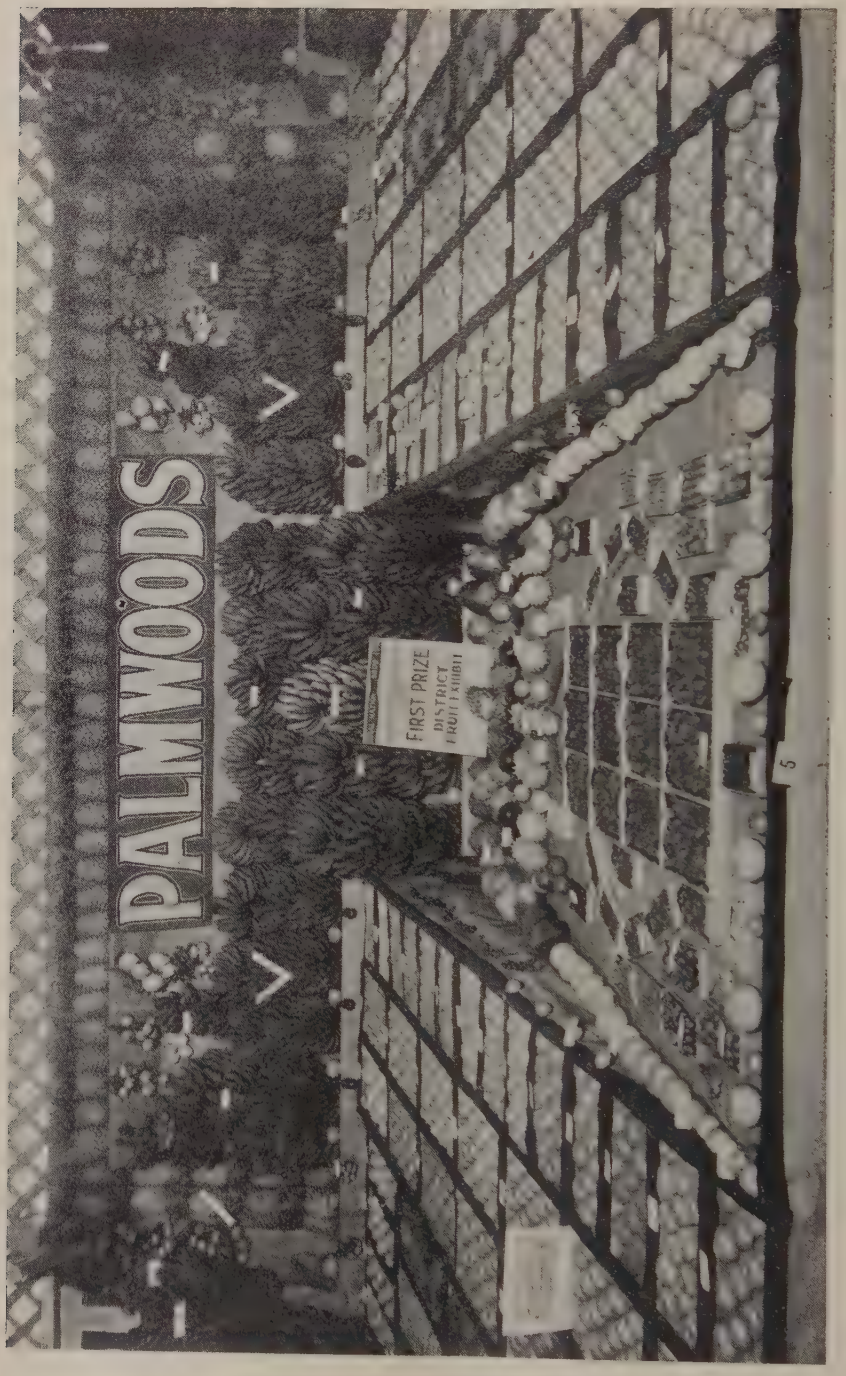


Plate 74.
THE FIRST PRIZE DISTRICT FRUIT EXHIBIT.

Plate 75.

PRODUCTS OF A FRUITFUL LAND.—This display, arranged by officers of the Fruit Branch of the Department of Agriculture and Stock, illustrated the remarkable range of temperate and tropical fruits for which Queensland is justly renowned.

Plate 76.

THE WOOL ALCOVE IN THE COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

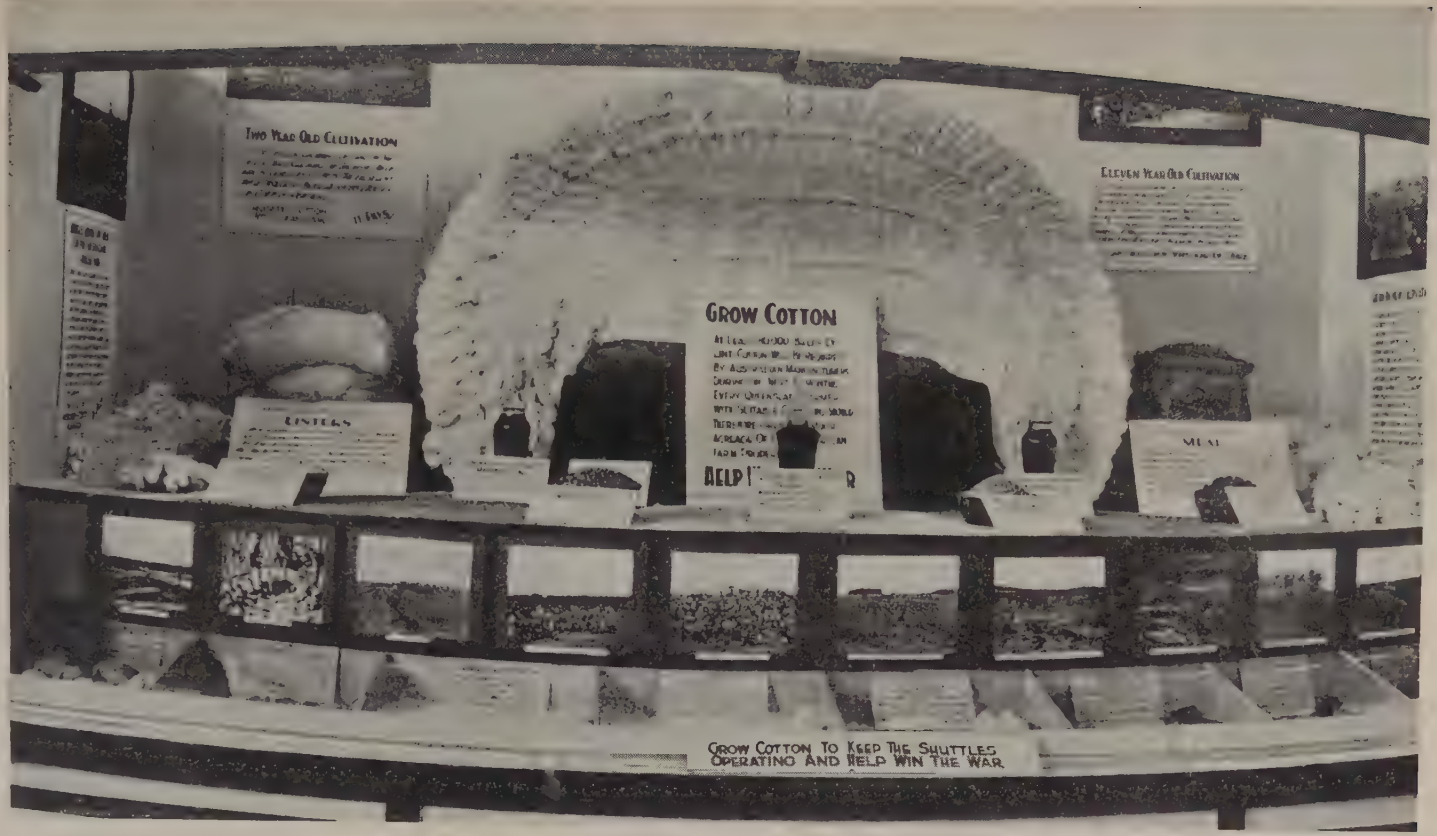


Plate 77.

FROM THE GINNERY TO THE SPINNERY.—Queensland cotton is produced for Australian industry, and this display arranged by officers of the Cotton Branch showed the quality of the home-grown fibre and the diversity and value of crop derivatives. For the cotton grower there is a guaranteed market and a guaranteed price. Farmers with suitable land are urged to plant as big a cotton acreage as they can properly cultivate.

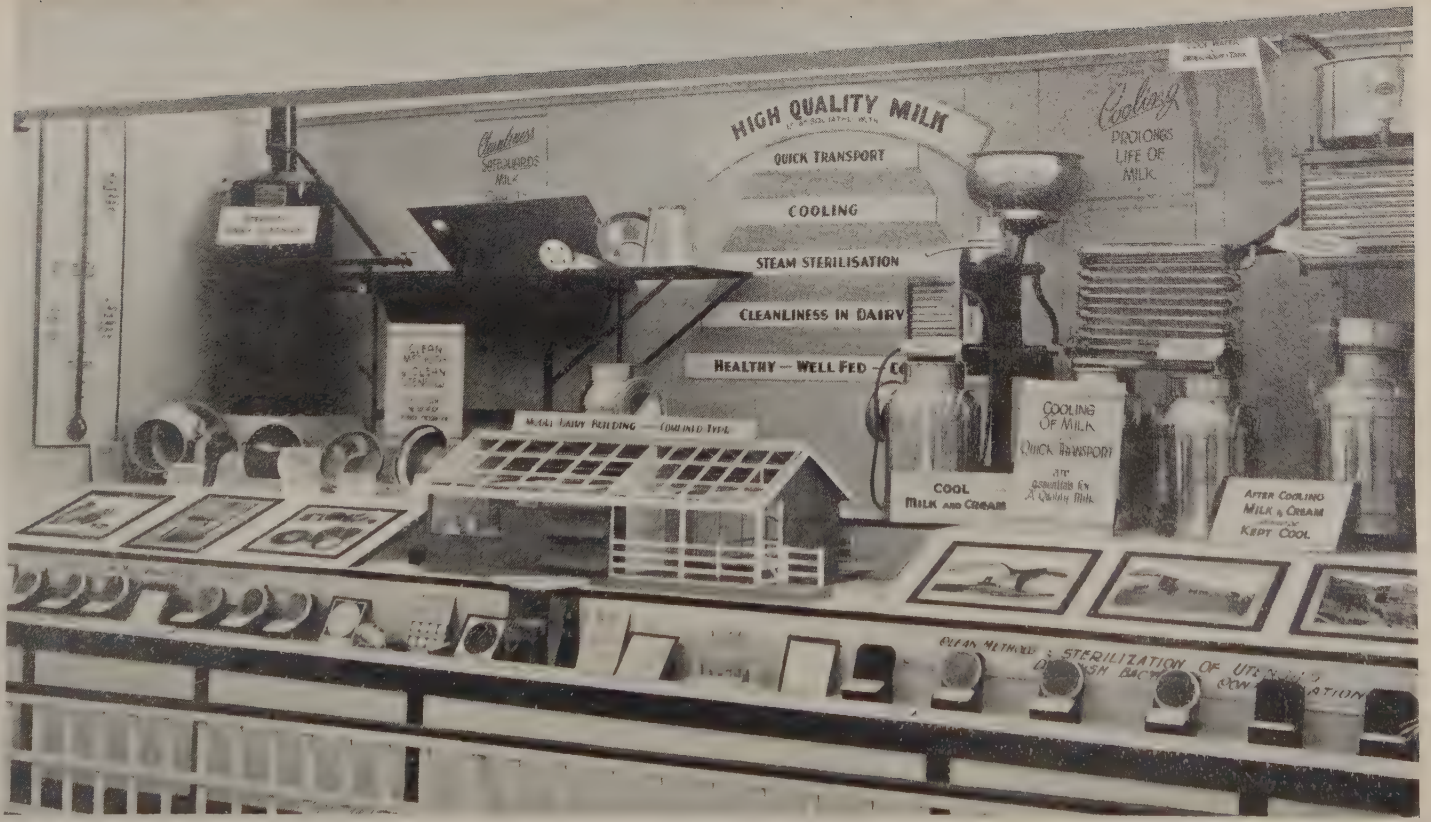


Plate 78.

"GADGETS AND WRINKLES" OF SUCCESSFUL DAIRYING.—Popular interest centred on this section of the departmental display in the Court of Agriculture.

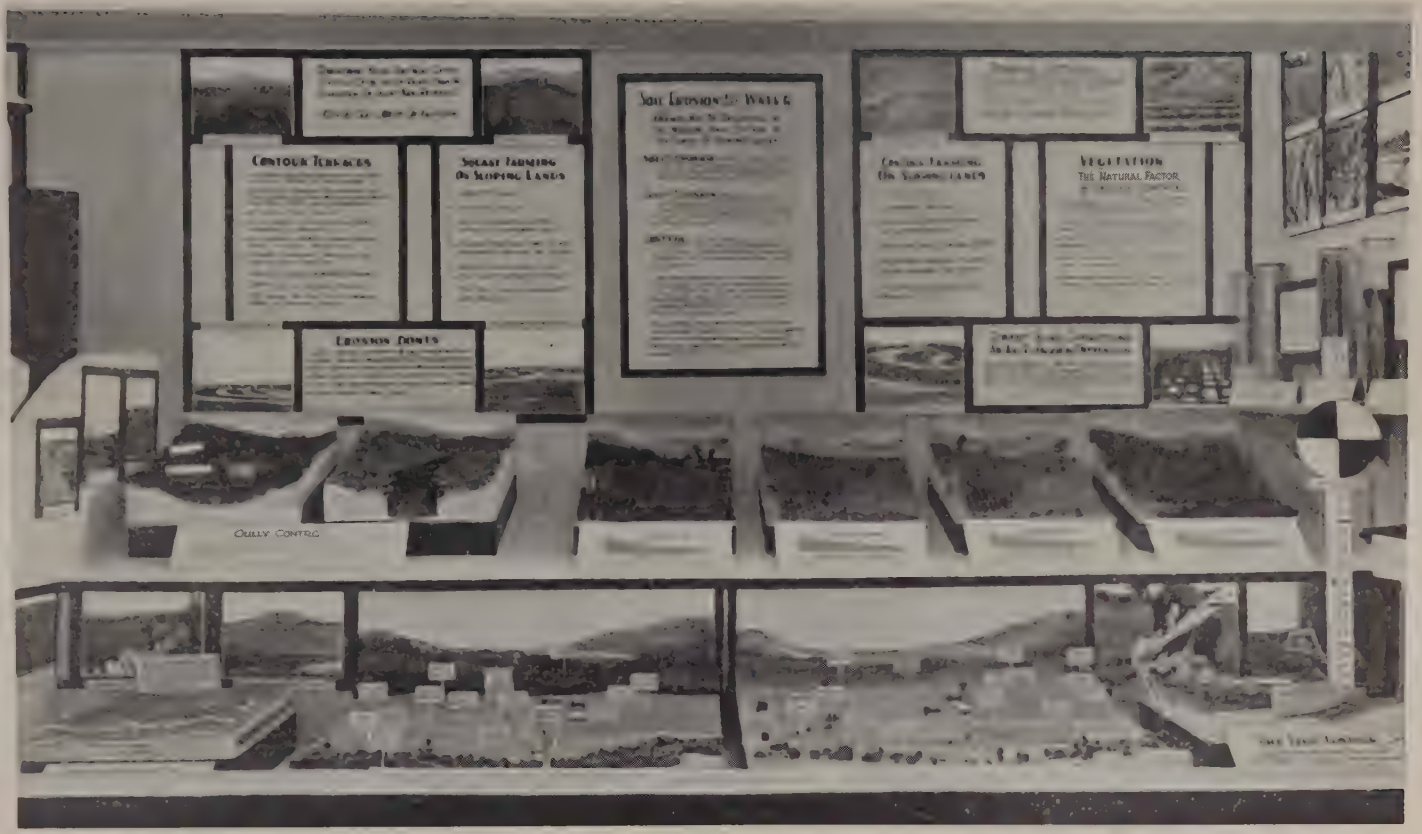


Plate 79.

Object Lessons in Sound Farming Practice.—Methods of soil security—the prevention of the washing of real wealth from ridge to river and the fertility which goes or blows with the wind—were demonstrated with landscape models in this alcove in the Court of the Department of Agriculture and Stock.

Plate 80.

PASTURE GRASSES AND POISONOUS PLANTS IN EDUCATIONAL CONTRAST.

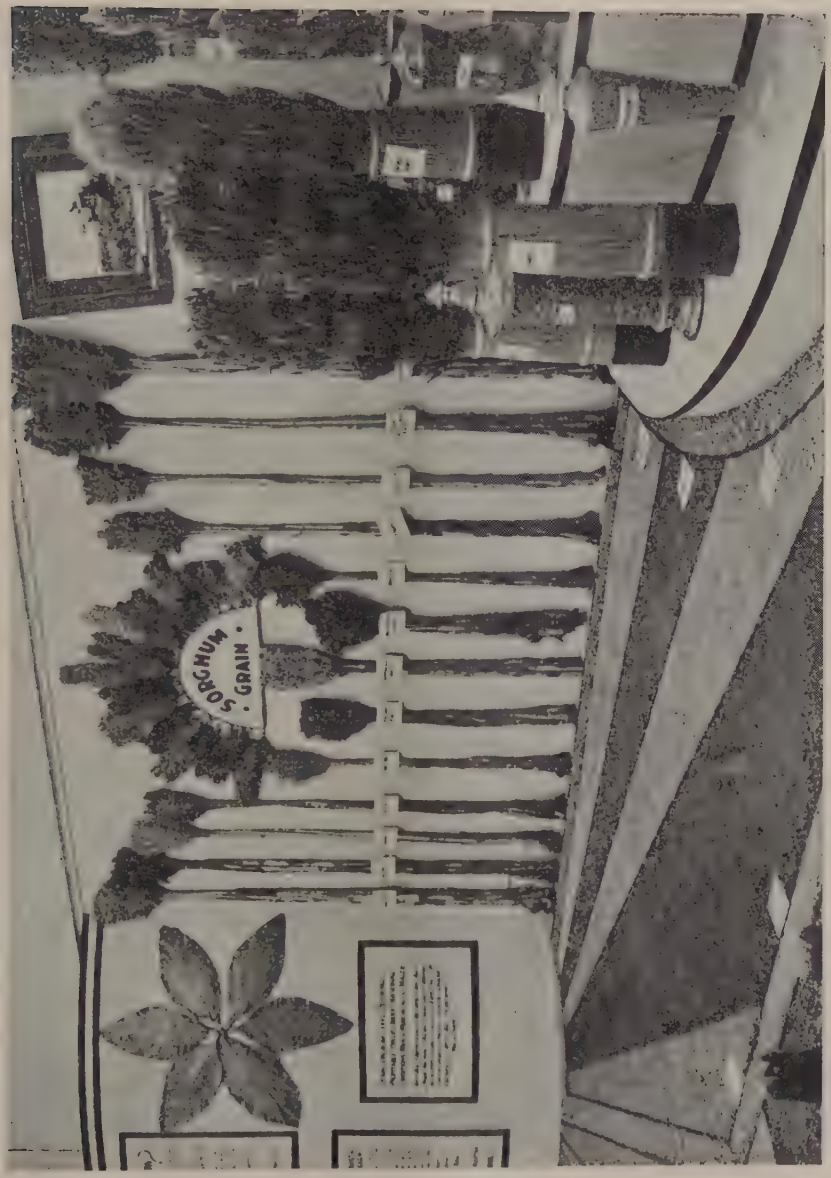


Plate 81.
An Array of Grain Sorghums in the Court of Agriculture.

Plate 82.

Fodder Conservation on the Farm.—Models of various types of silos built by the Instructional Staff of the Agricultural Branch demonstrated impressively the efficiency and economy of this form of livestock insurance.

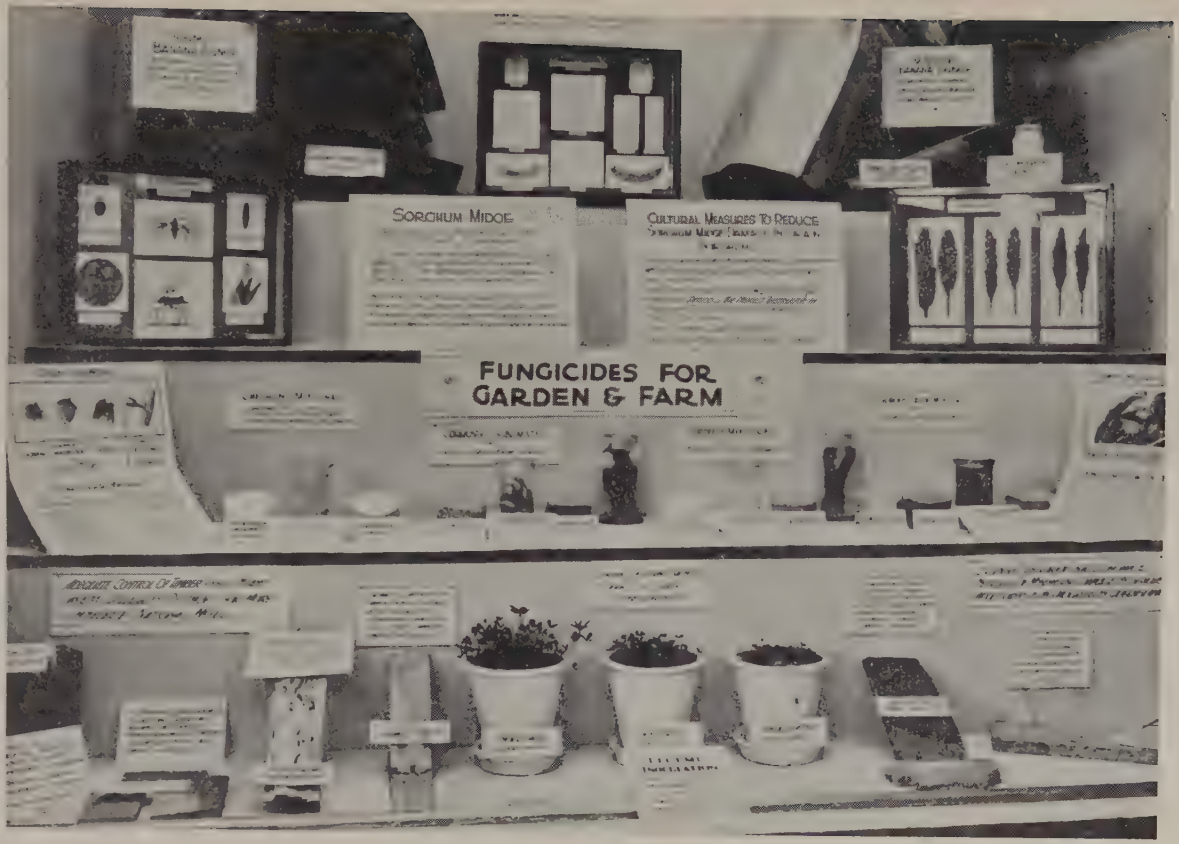


Plate 83.

LINKAGE OF SCIENCE WITH FARM PRACTICE.—Arranged by officers of the Research Division, this display illustrated impressively how pests and diseases of farm crops are effectively controlled.

Plate 84.
THE JOURNAL CORNER.—A well-organised and efficient information service was maintained throughout Exhibition Week.

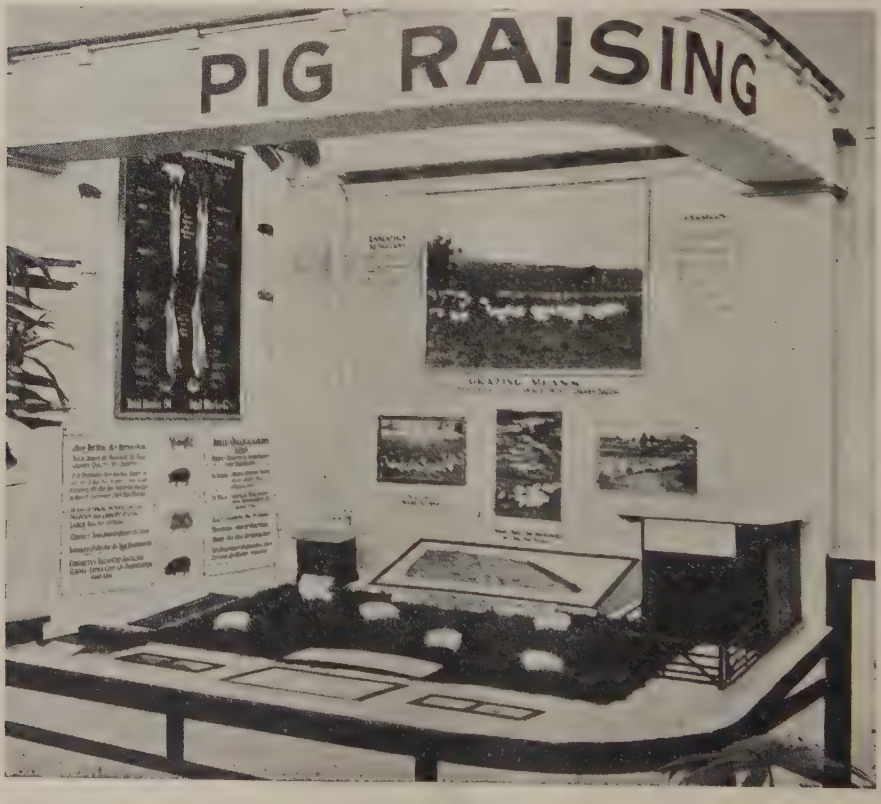


Plate 85.
POINTS IN PIGGERY PRACTICE WERE FITLY DEMONSTRATED IN THIS EXHIBIT.

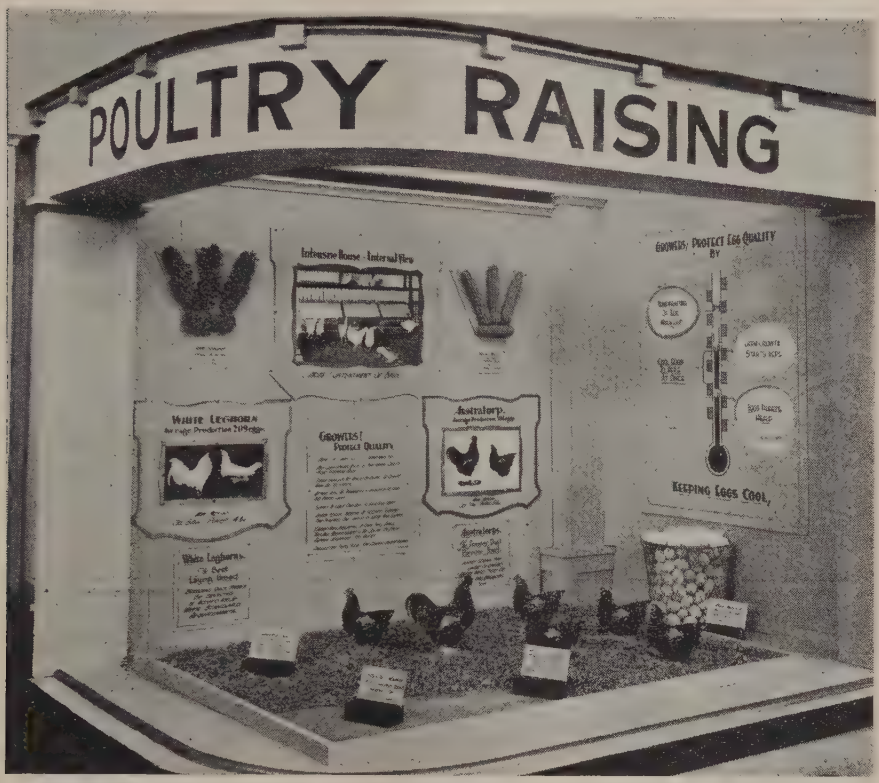


Plate 86.
THE POULTRY ALCOVE IN THE COURT OF AGRICULTURE.

POINTS IN POULTRY FARMING.

In poultry farming, culling serves two important purposes. By getting rid of the culls, all of the feed goes to the laying hens; and only the best hens remain in the flock to serve as future breeding stock.

Other sound points in poultry farming include care in the handling and marketing of eggs. Eggs are considered to be one of the best of foods, yet in spite of that fact the quantity consumed by Queenslanders (estimated on an annual *per capita* basis) is extraordinarily low. Why more eggs are not eaten is probably because their regular dietary value is not more widely appreciated. There are other reasons, too; for instance, the delivery of dirty-shelled eggs and the production of fertile eggs in hot weather. Clean nests, clean floors, and clean containers will soon overcome the dirt difficulty; while selling off all the male birds at the close of the hatching season is the answer to the other problem. Eggs should be gathered two or three times daily, and marketed at least twice weekly in hot weather.

In looking after poultry, even with the best of care, we often overlook a very common source of trouble, and that is the house fly. Flies can go a long distance and carry germs and contamination from a diseased flock, or from microbe-infested filth. The industrious pullet will chase and catch flies just for the fun of it, and, at the same time, take in all sorts of germs or worms. So it would be wise to clean up every attraction for flies and spray the fowl houses just before cleaning them out. For general health reasons, apart from the requirements of the fowl run, it pays handsomely to swat the fly.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
W. T. Burden, 44 Drayton road, Toowoomba	Harristown ..	White Leghorns, Australorps, and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
W. C. Carlow, Upper Brookfield	Adaville ..	Australorps, White and Brown Leghorns
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
F. Farrier, Miller road, Birkdale	Glenwood ..	White Leghorns
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
F. E. Hills, Sims road, Bundaberg	Littlemore ..	Rhode Island Reds, Australorps, White Wyandottes, White Leghorns, and Langshans
C. Hodges, Kuraby	Kuraby ..	White Leghorns
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington ..	Australorps, Rhode Island Reds, and White Leghorns
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
Miss K. E. Jenkins, Phillip street, Sandgate	Brooklands ..	Australorps, White and Brown Leghorns
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
A. E. Mengel, Campbell street, Toowoomba	Glenmore ..	White, Black, and Brown Leg- Leghorns, Anconas, Australorps, and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Coopers Plains	Norups	White Leghorns and Australorps
C. O'Brien, Hugh street, Townsville	Paramount ..	White Leghorns and Rhode Island Reds
H. Obst and Sons, Shepperd ..	Collegeholme ..	White Leghorns and Rhode Island Reds
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns and Australorps.
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Witty, Boundary road, Kuraby	Witty's ..	White Leghorns
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

USES FOR OLD MOTOR TUBES.

Many uses can be found for a strip of rubber from an old motor tube.

The hands are apt to get sore when digging, hoeing, and doing many other jobs which call for constant friction. Cut two pieces of the rubber as shown in the sketch, so that they will slip over and protect the fingers and palms, while being held in place by the loops formed to grip the back of the hands.

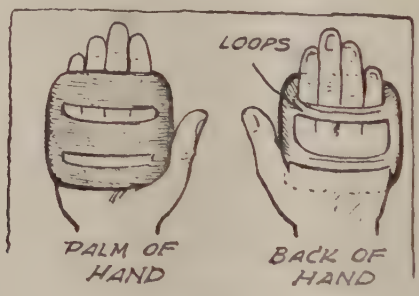


Plate 87.

Rings cut from a tube, slipped over the feet and up the legs keep the trouser bottoms from coming into contact with wet soil much more comfortably than the usual piece of string.

A number of strips twisted together and nailed to gate and post will act as a very efficient spring to keep the gate closed.

Two or three bands carried in the pockets will come in handy in a hundred odd ways when you are working about the garden, taking the place of string, wire, and nails in many places.

Packing Sheds and Equipment.

IN many deciduous fruit districts marketing activities are now at a minimum, and it is possible to overhaul, repair, replace, and add to the existing packing-shed equipment. Many growers carry on, season after season, with makeshift equipment, when, for a little time and a small expenditure of money, a properly-equipped packing shed could be furnished.

Packing stands, nailing-down presses and benches, sizing-machines, hammers, stencils, and other equipment should all be gone over and restored to a high state of efficiency. Simple designs for packing stands, nailing-down presses, and case-making benches can be procured, and are not hard to follow by anyone who is useful with a hammer and saw. Simple forms of sizing-machines can also be made at home, while those growers who have commercial machines should overhaul them thoroughly, tightening up all screws and bearings, and, if necessary, renewing the padding in the bins and feed channels. Broken parts should be replaced, and power plants overhauled. Broken handles in working tools should be renewed. Case end scrapers and packing needles should be sharpened and greased and packed away until required next season.

Complete sets of new stencils can be cut. A sheet of thin zinc, a small chisel, round and flat fine-grain files, a hammer, and a piece of end-grain hardwood are the necessary tools. The designs of the letters to be cut can easily be made by obtaining stencils, and copying them on to the zinc in the design wanted. The stencilled letters are then cut out of the sheet of zinc with hammer and chisel, and, in that way, an excellent stencil is made. Stencils are easily obtained, and there is no need to use blue crayon for marking cases.

When the overhauling of plant has been completed, growers should turn their attention to the cleanliness of the packing shed. Old cases and picking-boxes should be repaired or burned, a close inspection of the cracks and crevices being made for pupating insects, such as codling moths. Any shed-stored fruit which has rotted in the cases should be removed and destroyed and the cases thoroughly sterilized by completely immersing them in a 5 per cent. solution of formalin for at least one minute. Floors and other parts of the building affected by juice from rotted fruit should also be treated.

Close attention to these details will enable growers to make a clear start at the next harvesting period.

SELECTING THE DEEP SUCKER IN BANANA CULTURE.

At this period of the year banana plantations are making a flush of suckers. On the selection of the best sucker on each plant will depend the success of the following crop and the future life of the plantation.

The corm of a banana plant produces at least two rings of buds which, at growing periods, burst into growth. Of these, the top circle is about 2 inches from soil level and the lower circle is usually 2 or 3 inches below the top circle. Suckers from any of these buds do not send forth the correct follower.

At the base of the corm a bud is produced which bursts into growth at a particular stage in the life of the parent plant. From plantation trials extending over several years, it has been found that the parent plant sends out the correct follower sucker when it has made three-quarters of its growth.

The maturity of a banana plant is governed not by the time it is in the soil but by the nature of the conditions during its growth. The deep follower produced at the right stage by the parent plant has more vitality, and its roots are deeper, and it retains its sword leaves longer. The shallow follower, on the contrary, develops its mature foliage early and the corm rises above soil level, thereby preventing the effective functioning of its higher roots.

The careful digging out of a three-quarter mature plant will reveal the habit of sucker formation, both shallow and deep. If suckers are planted with the side of severance down-hill, the general experience is that the correct follower will invariably appear just where it is wanted—i.e., up-hill.

CULTIVATING NEW BANANA LAND.

The benefit to be derived from a through breaking-up of the soil in new land should not be overlooked, especially as so much forest country is now being used for banana-growing. If possible, breaking-up should be done before planting, but, with new land, time may not permit of this being done between burning-off and planting. Therefore, growers are advised to do this work during the first winter at the very latest, otherwise much damage may be done to the rooting system of the banana plants. Mattocks or fork hoes are the implements best suited for this work.

The land should be dug up to a depth of not less than 8 inches. A great improvement in the physical and mechanical condition of the soil will be observed soon afterwards. Increased root development, making possible the drawing of plant food from a much greater area, will result in vigorous plant growth and the production of larger bunches and fruit of higher grade.

On many farms, small crops, such as peas and beans, are planted between the rows of young bananas, and the thorough breaking-up of the soil will also benefit these crops, inducing quicker growth and greater bearing capacity.

The need for improving the humus content of the soil, particularly our forest soils, should be recognised. Humus can be added to the soil by burying the pea and bean plants after the pods have been picked. Shallow trenches should be dug across the slope of the land at convenient intervals, and the crop residues buried in the trenches under a covering of at least 2 inches of soil. The formation of these trenches across the slopes assists in preventing surface soil erosion.

Legumes such as beans and peas extract nitrogen from the air, and some of this nitrogen is returned to the soil in a readily available form when the roots and vines of these plants are turned under. The soil is thus enriched with this valuable plant-food. In addition, the humus content, fertility, and moisture-retaining capacity—a very important factor in successful banana-growing—of the soil is increased or, at least, maintained.

Where the soil has been well dug, less chipping is required, because the rapid growth of the banana plant soon controls weed growth; besides, mechanical condition of the soil is improved, making chipping easier and thus reducing cultivation and production costs.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

DRY weather conditions still continue in most fruit and vegetable districts, to the detriment of fruit and vegetable supplies. Growers are still urged to keep up the maturity of all fruits during the colder months, particularly to southern markets where the ripening of tropical fruits is not assisted by their winter conditions. Fruit at present should be carefully packed to a colour standard. These conditions will, of course, alter as the season advances into October, when care will need to be exercised in selecting less advanced fruit.

Prices during the last week of August were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 5s. to 9s.; Sixes, 7s. to 11s.; Sevens, 8s. to 13s.; Eights, 10s. to 14s.; Nines to 15s.

Sydney.—Cavendish: Sixes, 8s. to 12s.; Sevens, 9s. to 15s.; Eights and Nines, 12s. to 16s.

Melbourne.—Cavendish: Sixes, 9s. to 13s.; Sevens, 11s. to 15s.; Eights and Nines, 13s. to 16s.

Adelaide.—Cavendish: 12s. to 18s. per case. Some lines showing squirter.

Brisbane.—Sugars, 1d. to 4d. dozen. Inferior lines lower. Lady Fingers, 2d. to 9d. per dozen.

Pineapples.

Brisbane.—Smooths, 3s. to 6s. case; 1s. to 5s. dozen. Roughs, 4s. to 6s. case; 1s. to 5s. dozen.

Melbourne.—Smooths, 8s. to 12s. per case. Black heart prevalent.

Adelaide.—Smooths, 12s. to 15s. per case.

Custard Apples.

The season for this fruit is now at an end. Prices throughout the year have maintained high levels.

Papaws.

Brisbane.—Locals, 2s. to 4s. 6d.; Yarwun, 5s. to 7s. tropical case; Gunalda, 3s. 6d. to 4s. 6d. bushel.

Sydney.—6s. to 10s. Some lines still arriving on the green side.

Melbourne.—8s. to 10s.; well coloured lines to 12s.

CITRUS FRUITS.

Oranges.

Brisbane.—Commons, 5s. to 8s.; Navels, 6s. to 9s.

Sydney.—Navels to 10s.

Melbourne.—Navels, 6s. to 12s.

Mandarins.

Brisbane.—Emperors, 8s. to 15s.; Scarlets, 10s. to 18s.; King of Siam, 9s. to 13s.

Sydney.—Emperors, 8s. to 11s.

Melbourne.—Emperors and Scarlets, 7s. to 14s.

Lemons.

Brisbane.—5s. to 11s.

Sydney.—8s. to 10s.; specials higher.

Melbourne.—7s. to 10s.; specials higher.

Grapefruit.

Brisbane.—4s. to 7s.

Sydney.—7s. to 11s.

Melbourne.—7s. to 12s.

OTHER FRUITS.

Avocados.

Brisbane.—8s. to 10s.

Strawberries.

Brisbane.—4s. to 9s. dozen. Many lines affected by rain.

Sydney.—9s. to 12s. 6d. dozen; trays, 2s. 6d. to 6s. Many lines affected by rain.

Passion Fruit.

Brisbane.—First grade, 8s. to 11s. half-bushel; Seconds, 5s. to 7s.

Tomatoes.

Brisbane.—Coloured, small, 4s. to 7s.; others, 8s. to 11s.; Ripe, 4s. to 8s.; Green—Locals, 3s. to 6s.; Northern, 4s. to 9s.

Sydney.—South Queensland: Special Coloured, 10s. to 13s.; Others, 6s. to 10s.; Bowen, 4s. to 10s.; specials higher.

Melbourne.—Queensland, 6s. to 8s. for repacks; West Australia, 5s. to 10s. half-bushel; Adelaide, 14s. to 17s. half-bushel.

VEGETABLES.

(Brisbane prices only, unless otherwise stated.)

Beans.—Brisbane, 18s. to 25s. bag; inferior lower; Sydney, 12s. to 22s. bushel. Many inferior lines noted. These will assist in creating poor prices. Melbourne, 10d. to 1s. 2d. lb.

Peas.—Brisbane, 18s. to 22s. bag—values eased at week-end to 12s. to 15s.; inferior lower; Melbourne, 6d. to 9d. lb.

Cauliflower.—Small, 2s. to 4s. dozen; good lines, 6s. to 10s.; Stanthorpe, 10s. to 14s. chaff bag.

Cabbage.—6s. to 12s. dozen; specials higher.

Carrots.—6d. to 1s. 6d. bundle.

Beetroot.—6d. to 1s. 6d. bundle.

English Potatoes.—2s. 6d. to 5s. sugar bag.

Sweet Potatoes.—2s. to 3s. 6d. sugar bag.

Rhubarb.—1s. to 1s. 6d. bundle.

Marrows.—2s. to 5s. dozen; Sydney, 8s. to 10s. per case.

Pumpkins.— 5s. to 6s. 6d. bag.

Lettuce.—9d. to 3s. 6d. dozen.

VALUE OF LIQUID MANURE.

Value of the liquid manure from a herd of forty dairy cows would, in twenty-five weeks, reach a total of £50, or 25s. per cow, if fully conserved (says a Scottish investigator). Three and a-half tons of potash salts—now almost unobtainable—two and a half tons of sulphate of ammonia, and a half ton of superphosphate is estimated to be needed to make a dressing of artificials of equal manurial value. This is one of the reasons why every effort should be taken to see that liquid manure is used to the full on every farm.

General Notes

Staff Changes and Appointments.

The following officers of the Department of Agriculture and Stock have been appointed Local Supply Officers for the purposes of the "National Security (Emergency Supplies) Rules of 1941" at the centres mentioned:—Messrs. S. E. Stephens (Instructor in Fruit Culture), Cairns; C. C. Barth (District Inspector of Stock), Townsville; S. C. Smith (Inspector of Stock), Mackay; and L. J. C. Mullen (Fauna Protector), Rockhampton.

Mr. A. James, loader for the Committee of Direction of Fruit Marketing at Howard, has been appointed also an Inspector under *The Diseases in Plants Acts* in place of Mr. J. F. Whitby, resigned.

Messrs. F. P. Walsh and R. H. Sanders, of Eagle Heights, have been appointed honorary rangers under *The Native Plants Protection Act* and honorary protectors of fauna.

Mr. J. Shilkin, veterinary surgeon (milk investigation), has been appointed also an inspector under *The Diseases in Stock and Dairy Produce Acts.*

Miss M. E. B. Power has been appointed an assistant cane tester for the current sugar season at Moreton Mill, Nambour, in place of Mr. A. Byrne, resigned.

Mr. W. D. Scott (Green Island) has been appointed an honorary ranger under *The Native Plants Protection Act* and honorary protector of fauna.

Mr. J. W. McMullen (Rockhampton) has been appointed an honorary protector of fauna.

Constables F. S. Tapsall (Cooroy) and D. Chapman (Malbon) have been appointed also inspectors under *The Slaughtering Act.*

Avocado Levy and Extension of Pineapple Levy.

A Regulation has been issued under *The Fruit Marketing Organisation Acts* empowering the Committee of Direction of Fruit Marketing to make a levy on all avocados marketed from 15th July, 1941, at the following rate:—

(1) On all avocados sold, consigned, or delivered by rail to any agent, person, firm, company, or corporation in Queensland at the rate of 3s. 4d. per ton with a minimum of 1d.;

(2) On all avocados sold, consigned, or delivered otherwise than by rail to any Queensland railway station to any agent, person, firm, company, or corporation at the rate of 1d. per case.

An amendment of this Regulation has also been approved, and this provides that the levy shall be at the rate of 6s. 8d. per ton instead of 3s. 4d. per ton.

A further Regulation has been issued under the abovementioned Acts extending the Pineapple Levy Regulation, which came into operation in August, 1940, for a further period from 25th August, 1941, to 31st December, 1941. For the period of the extension, the Committee of Direction has reduced the levy on fresh pineapples from 2d. to 1d. per case.

Fauna Sanctuary.

An Order in Council, issued under *The Fauna Protection Act of* 1937, declares the property of Mr. A. H. Wheatley, "Happy Days," at Mission Beach, via Tully, to be a sanctuary for the protection of fauna. Mr. Wheatley has been appointed an honorary protector for the sanctuary.

Fruit Marketing Organisation Acts.

Regulations have been issued under *The Fruit Marketing Organisation Acts* constituting the electorates for the purpose of electing members of the various sectional group committees. These include the banana, pineapple, citrus, deciduous, and other fruits sectional group committees.

Herbert River Cane Levy.

A regulation has been issued under *The Primary Producers' Organisation and Marketing Acts* empowering the Herbert River District Cane Growers' Executive to make a further general levy for administrative purposes on suppliers of sugar-cane to the Macknade and Victoria mills at the rate of ½d. per ton.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production records for which were compiled during the month of July, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
Mature Cow (Standard, 350 lb.).				
Alfa Vale Model 2nd (328 days)	W. H. Thompson, "Alfa Vale," Nanango	18,529·8	903·901	Reward of Fairfield
Junior, 3 Years (Standard 270 lb.).				
Ventnor Mab	C. W. Black, "Ventnor," Kumbia	7,876·78	342·419	Kyabram Twiney Boy
Newhaven May (235 days)	E. O. Jeynes, "Newhaven," Raceview	6,132·0	282·121	Croyden Magnet
Senior, 2 Years (Standard 250 lb.).				
Merrivale Buttercup 9th (257 days)	W. Soley, Malanda	8,086·35	250·190	Greyleigh Honorarium
Junior, 2 Years (Standard 230 lb.).				
Carn Brea Sunrise	A. T. Paull, Bowenville	6,274·94	296·730	Laguna Emblem
Murray Bridge Pansy 2nd (250 days)	A. T. Paull, Bowenville	5,379·75	255·955	Murray Bridge De Valera
Carn Brea Angel	A. T. Paull, Bowenville	6,021·3	251·403	Laguna Emblem
Parkview Fussy 67th (243 days) (Died)	J. Crookey, Allora	5,695·05	245·585	Parkview Radiant
Merrivale Bonnie 7th	W. Soley, Malanda	7,713·75	243·719	Greyleigh Gleaner
Murray Bridge Nancy	A. T. Paull, Bowenville	5,334·76	236·316	Murray Bridge De Valera
JERSEY.				
Mature Cow (Standard, 350 lb.).				
Vanette of Linwood	F. W. Kath, Moffatt, *via* Dalby	9,155·23	550·785	Aerofoil of Banyule
Kathleigh Lady	F. W. Kath, Moffatt, *via* Dalby	9,396·35	528·473	Retford King's Thorn
Kathleigh Promise	F. W. Kath, Moffatt, *via* Dalby	9,544·07	523·269	Retford Royal Atavist
Pride of Linwood (365 days)	C. W. Barlow, Irvingdale road, Dalby	8,639·3	491·304	Listowel Royal Heir
Langside Prim	S. H. Caldwell, Walker's Creek, Bell	9,084·04	466·585	Masterpiece Yeribee of Brucevale
Kathleigh Faith	F. W. Kath, Moffatt, *via* Dalby	8,369·52	464·546	Retford Royal Atavist
Trinity Lady Hopeful	J. Sinnamon and Sons, Moggill	6,888·13	366·359	Somehope (Imp.)

Senior, 4 Years (Standard, 330 lb.).				
Kathleigh Ettie	F. W. Kath, Moffatt, *via* Dalby	8,961·48	511·494	Retford King's Thorn
Junior, 4 Years (Standard, 310 lb.).				
Inverlaw Golden Belle	R. J. Crawford, Inverlaw, *via* Kingaroy	8,173·02	456·880	Oxford Royal Lad
Inverlaw Patsy	R. J. Crawford, Inverlaw, *via* Kingaroy	8,221·73	456·159	Oxford Royal Lad
Kathleigh Beauty	F. W. Kath, Moffatt, *via* Dalby	8,500·26	450·354	Retford King's Thorn
Inverlaw Mabel	R. J. Crawford, Inverlaw, *via* Kingaroy	8,906·02	442·159	Oxford Royal Lad
Senior, 3 Years (Standard, 290 lb.).				
Inverlaw Phyllis	R. J. Crawford, Inverlaw, *via* Kingaroy	11,081·25	616·969	Oxford Royal Lad
Inverlaw Lady Cynthia	R. J. Crawford, Inverlaw, *via* Kingaroy	8,648·86	503·904	Carnation Buttercup 2nd's Prince 2nd
Kathleigh Mabel	F. W. Kath, Moffatt, *via* Dalby	7,662·25	405·897	Kathleigh Royal Flyer
Junior, 3 Years (Standard, 270 lb.).				
Gem Mabel	W. Bishop, Kenmore	8,436·77	422·92	Laces Volunteer of Ardroy
Rosedale Moolabin Mist 3rd	L. Sheehan, Innis Park, Bundaberg	5,465·41	302·590	Carnation Queens Duke
Senior, 2 Years (Standard, 250 lb.).				
Strathdean Favourite	S. H. Caldwell, Walker's Creek, Bell	5,813·25	378·346	Langside Noble Dreamer
Junior, 2 Years (Standard, 230 lb.).				
Kathleigh Daffodil	F. W. Kath, Moffatt, *via* Dalby	7,656·45	418·521	Retford King's Thorn
Erceldene Pretty Lass	C. W. Barlow, Irvingdale road, *via* Dalby	5,148·54	272·928	Navua Bontillcere's Lad
Holmsdale Cora	J. Cummings, Nerang	5,093·75	256·806	Richmond Thor
Fauvic Firefly	H. Cochrane, Fauvic, Kin Kin	4,887·4	249·98	Fauvic Nightlight
Trinity Handsome Belle	J. Sinnamon and Sons, Moggill	4,931·53	244·06	Trinity Cute Prince 3rd
Lermont Fancy	P. H. Schull, " Woodview," Oakey	4,472·35	237·934	Hillgrove Maurice

Farm Notes

OCTOBER.

CULTIVATORS or scufflers should be kept moving through early-sown row crops to keep down weeds and maintain a surface mulch, for rain falling on a caked surface soil may not penetrate to any great depth. To check losses of soil during summer storms, all row crops should be sown at right angles to or athwart the prevailing slope.

Sowings of maize, sweet sorghums, grain sorghums, sudan grass, millet, cowpea, peanuts, pumpkins, melons, may be continued and sweet potatoes planted out.

On the western Downs and Maranoa, farmers are advised to sow Sudan grass, which has proved itself in recent years as a summer crop, whether for grazing, hay, or silage.

As a summer-growing fodder plant rich in protein, which can be grazed, or converted into hay or silage (in combination with maize or sorghum) cowpea should be considered. Suitable varieties are black, Poona, and groit. October is a good month for the establishment of summer grasses, chiefly paspalum and Rhodes. Paspalum may be broadcast on scrub "burns," or ploughed land of reasonably high fertility, at the rate of 8-12 lb. seed to the acre, adding white clover seed at the rate of 2 lb. to the acre. Rhodes grass, which is preferred in districts too dry to support paspalum, may be sown from October to January, the ashes left after the burning of timber on scrub land providing an excellent seedbed. No useful results are obtained by broadcasting Rhodes or other grasses on uncultivated land other than a scrub "burn." From 4 to 6 lb. of tested seed to the acre usually provides a good stand.

Where wheat crops are being converted into hay, these should be cut a few days after the flowering stage as they then contain the maximum nutritive value, the nutriment at that stage being spread evenly throughout the plant. A greater tonnage can be obtained by cutting at a later stage, but only at the expense of feeding value and colour.

As harvesting becomes general during November, all necessary machinery should be given a complete overhaul, in order to avoid stoppages at a critical period.

WOMEN ON THE LAND IN WAR TIME.

In these days, women on the land in war-time Britain have a hard row to hoe in more senses than one. Farm work demands skill and knowledge, and is often so heavy that the British farmer has been doubtful about taking on women as farm workers. However, there are about 10,000 girls of the British Land Army now taking the place of men on farms, and they have proved their value. They are generally employed in specialised branches—poultry, dairy, young stock, fruit and market gardening—but a tour of the British countryside showed them handling many heavier jobs—cranking a tractor, "scruffing" calves, and other jobs calling for strength, and they were doing them automatically as if physique counted for nothing. And, more than that, they are taking real war risks without turning a hair. One now famous area in East Kent was being sprayed with shrapnel with tractors well within what the gunner calls the "cone of dispersion." None of the girls driving the tractors asked for a transfer. Instead, they applied for tin hats—and got them—and went on ploughing.

Women in the British villages are saving cargo space by making jam. The country women's associations are all busy on the job. Jam-making centres have been set up in village halls, in empty garages, sometimes in farm kitchens, and every woman lends a hand picking, preparing the fruit, and making jam. Reckoning the average British family now eats 3 lb. of jam a week, these village women, during six months, made enough jam to supply, roughly, 250,000 families for a year.

There is no doubt that one of Britain's greatest assets is her genius for improvisation—doing the unexpected in the unusual way, so to speak. Centuries of freedom have accustomed our women to think for themselves, and from amidst all the destruction and confusion of war they are taking their full share of the national responsibilities. No doubt, the fine attributes of the feminine mind, the eye for detail, and dislike for waste, are proving of value beyond estimate in doing the nation's housekeeping from day to day.

Orchard Notes

OCTOBER.

THE COASTAL DISTRICTS.

OCTOBER is usually a dry month over the greater part of Queensland; consequently the advice given in the notes for August and September on the necessity of thorough cultivation to retain moisture is again emphasised. Thorough cultivation of all orchards, vineyards, and plantations is imperative if the weather is dry, as the surface soil must be kept in a state of soil mulch.

All newly-planted trees should be watched carefully; if they show the slightest sign of scale or other pests they should receive attention at once.

Bananas.

In the warmer districts, banana planting may be continued. All winter trash should be removed and the stools cleaned up. If not already done before the winter, young plantations planted in the previous season should be desuckered without delay. Plants desuckered last autumn should be gone over again, and old plantations also should receive attention. Grow to each stool the number of stems which experience proves to be permissible, but only allow each stem to grow a single follower. Borers will be active again soon, and trapping should be intensified towards the end of the month and supplies of paris green and flour (one part to six by weight) made up in readiness. Caterpillar and grasshopper plagues often occur from the end of the month onwards, and it is wise to lay in a supply of arsenic pentoxide for use in the preparation of bran baits. Watch the plantation carefully for bunchy top, and kerosene and destroy any affected plants without delay. The season of vigorous growth is now commencing, and it will pay well in more and better fruit and in stronger suckers for the next crop to apply a dressing of a complete fertilizer to each stool. Cultivate well to retain moisture, aerate the soil, and kill weeds before they seed. This will also prepare the soil for the planting next month of a green cover crop such as *Crotalaria goreensis*, thus shading the soil, preventing erosion on slopes, and enriching the soil with nitrogen and humus.

Clean out all banana refuse from the packing shed, and resolve not to allow it to accumulate in future. This will reduce the risk of the development of many fungus rots in the packed fruit.

Pineapples.

From now onwards pineapples may be planted in most districts. Plough thoroughly, remembering always that in the life of a plantation there will be several seasons during which it will be neither possible nor desirable to do more than disturb the surface layer. Obtain advice from the Department of Agriculture and Stock as to whether the soil is sufficiently acid, and, if not, how much sulphur to apply. Care should be taken in the layout of the rows to save time and labour in cultivation and harvesting, and minimise erosion. Select planting material with discrimination from healthy and vigorous plants of a good bearing type. Beware of planting "collars of slips." Always strip off the base leaves and dry in the sun for a few days, and plant shallow. As soon as the roots form, apply 3 cwt. of 10-6-10 fertilizer to the acre. All established plantations are due for their spring fertilizer at the rate of not less than 5 cwt. to the acre. Keep down weeds with a dutch hoe, but do not disturb the soil deeply, always remembering that the pineapple is shallow-rooted and receives a sharp setback if the roots are cut or disturbed with horse-drawn implements. Clean out all pineapple refuse from the packing shed and surroundings, and thus prevent much fungus trouble in the summer pack.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

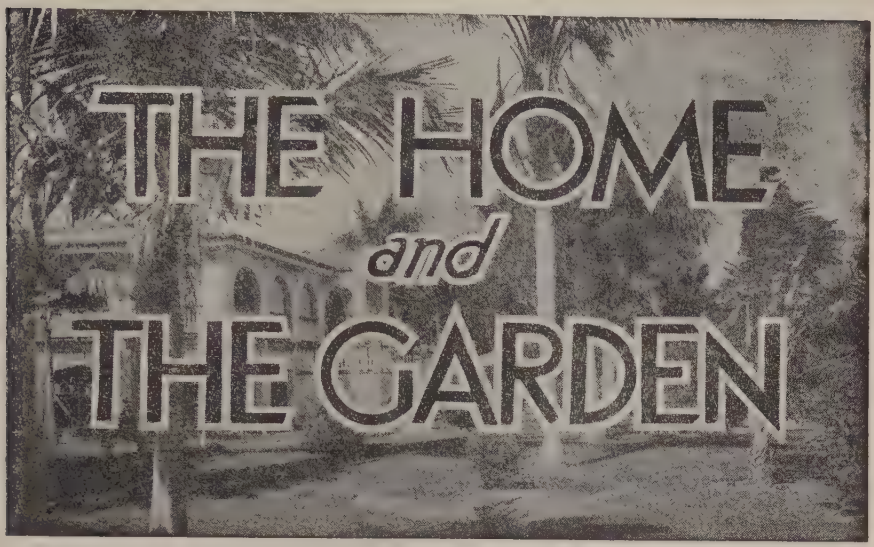
MUCH of the matter contained under the heading of "The Coastal Districts" applies equally to the Granite Belt and the Southern and Central Tablelands, for on the spring treatment the orchard and vineyard get the succeeding crop of fruit very largely depends. The surface of all orchards and vineyards should be kept loose. In the western districts, irrigation should be applied whenever necessary, but growers should not rely on irrigation alone, and should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch to prevent surface evaporation.

All newly-planted trees should be looked after carefully and only permitted to grow the branches required. All others should be removed as soon as they appear. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus disease on the young trees, they should be dealt with at once by the use of such remedies as black leaf forty, bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, for if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, the trees should be sprayed with bordeaux mixture and lime sulphur according to the schedule recommended by the Department. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and afterwards at intervals of about three weeks. Spraying for codling moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit is grown it must be attended to if this insect is to be kept in check.

In the warmer localities, a careful check should be kept on any appearance of the fruit fly, and, if found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving much of the earlier-ripening summer fruit, if not the bulk of the crop. Tomato and potato crops will require spraying with bordeaux mixture, likewise grape vines. Keep a very strict watch on all grape vines, and, if they have not been treated already, do not delay a day in spraying if any sign of an oil spot—the first indication of downy mildew—appears on the top surface of the leaf. Spraying with bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop; but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers may be certain that their grape crop will not take long to harvest.

Where new vineyards have been planted, spraying also is necessary, for if this is not done the young leaves and growth are apt to be affected so badly that the plant will die.

Plate 88.
INTERIOR OF FRUIT MARKET, SYDNEY.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH: NATION'S WEALTH.

YOUR CHILDREN AND THE SUNSHINE.

THE other day I was reading a fairy story to my small niece—you all know the one where the fairies appear and present the new baby with gifts, beauty and riches, and suchlike things.

Some babies are still presented with these gifts, but there is one gift that every Queensland baby receives, and I do not think that mothers appreciate it nearly as much as they should—the sunshine.

In our various articles you have learnt some of the reasons why so many babies born healthy die in the first year or two of their lives or grow up into children who are always sickly and ailing. Amongst the causes of death are the respiratory infections—that is, infections of the parts of the body concerned with breathing—nose, throat, and lungs. Diseases caused by these infections include the common cold, whooping cough, bronchitis, and pneumonia. We are all so used to seeing people around us with colds, &c., that we have begun to believe that they are not of much importance, that everyone gets them, and it cannot be helped. We must not look at it in this way. In our effort to save our babies the prevention of these diseases is a serious consideration. Of course, while we live in cities and are crowded together in trams, trains, and picture shows, we cannot avoid coming into contact with the germs which cause these diseases. As we told you in our article last month, the germs are sprayed into the atmosphere by children, and alas! sometimes by grown-ups also, coughing and sneezing carelessly and without using a handkerchief.

The best thing to do, therefore, is to start a physical fitness campaign in our own homes and develop our own physical health and that of our babies and children, so that our bodies will be able to resist these germs. This is where our wonderful sunshine can help us quite a lot.

Our spring weather is beginning, so let us think of the ways in which we can use our sunshine to keep our children fit and enable them to build up strong, healthy bodies.

For very many years we have known that sunlight destroys germs: it is the cheapest and safest antiseptic in the world. So open wide your windows and doors and let the sunlight in! Let it have free access to your children's play pens, cots, and play grounds, and destroy these germs of colds and other ills. Some mothers may be afraid that the strong chemical action of the sunlight may cause carpets and curtains to fade, but surely it is better that carpets should fade than that the little ones should lose their colour.

Another value of sunlight which was discovered more recently is that in connection with the cure of rickets and tuberculosis. During the course of treatment it was found that children suffering from these diseases could be cured by exposing their bodies to sunlight for some hours each day, by providing them with food of the right kind, and by giving them the necessary rest and sleep. Surely in a country like ours, where we can grow all the necessary foodstuffs, and where most of the days are bright and sunny, we should not have to cure these diseases at all but should be able to prevent them.

Sunlight is a most important factor in helping the body to make use of the minerals supplied in the food. In our talk on "Baby's Teeth" last year you were told that baby's teeth and bones are built up of two minerals—lime and phosphorus—and a list of the foods containing a good amount of these minerals was given.

However, before the body can use these minerals properly it is also necessary to have a supply of a vitamin known as Vitamin D. We get this vitamin in certain food, such as cod and other fish liver oils, and also to a smaller degree in eggs and butter and milk, but it can also be formed by the action of the sunlight on the skin.

So you see that sunbathing is not used just to provide the skin with a nice coat of tan during the summer holidays, but properly carried out can be a most useful means of giving our children healthy bodies with strong well-built bones and muscles, and a good resistance to disease. Rickets is a disease which causes the bones to remain soft and also affects the nervous system.

Fortunately, we do not find in Queensland the many cases of chronic chest troubles and serious rickets which are found in England and other countries where the sunshine is not as constant as it is here, and where the smoke of factories in the larger manufacturing towns obscures the sunlight, or where very high buildings prevent it from reaching the city streets.

But our doctors tell us that some of our Queensland children suffer with a mild form of rickets and become very pale and lacking in tone. This is likely to happen to children who are brought up in flats which may be on the dark side of a building, and where there is no garden space, or it may happen in parts of the State where the rainfall is sometimes fairly continuous for days or even weeks at a time. Mothers could prevent their children developing this trouble by giving sunbaths regularly while the fine weather lasts, and even during the wet weather suitable shelters or parts of the house could be used for sun and air bathing when the weather does become fine for a few hours.

You see then that the sunshine is first of all Nature's builder—helping baby's body to use his food to the best advantage and to grow strong and resistant. Secondly, it is Nature's doctor, killing the disease germs which would harm our children, or helping to cure them when they do become ill. Next month we shall talk more fully about sunbathing and the method of carrying it out correctly.

You can obtain further advice on this or any other matter relating to the feeding and management of children up to school age by writing to "Baby Clinic, Brisbane." Such letters need not be stamped.

IN THE FARM KITCHEN.

SHORTBREAD RECIPES.

Apricot Prune Shortcakes.

Ingredients: 2 level cups sifted self-raising flour, pinch of salt, 2 oz. butter, ¼ cup castor sugar, 1 egg, ½ cup milk, stewed or canned apricots and prunes, sweetened whipped cream.

Method: Sift flour and salt into basin, rub butter in lightly with fingertips, and add sugar. Moisten with beaten egg and milk, mixing evenly, and place in buttered recess cakepan (about 8 inches square). Bake in moderately hot oven for twenty to twenty-five minutes, and lift on to cake cooler. Cut warm mixture into

two layers, spread with butter, then cover with apricots and stoned prunes, joining the cake layers. Top with more fruit, decorate with sweetened whipped cream, and serve as cake or dessert. Peaches, bananas, strawberries, blackberries, loganberries, apples, rhubarb, raspberries, pineapple, or passionfruit may be used in the same way, and individual shortcakes may be similarly made.

Shortbread.

Ingredients: 3 oz. castor sugar, 7 oz. butter, pinch of salt, 9 oz. flour, 2 oz. rice flour, ½ teaspoon baking powder, citron peel or crystallised fruits.

Method: Sift sugar, salt, flour, rice flour, and baking powder on to marble slab or pastry board. Rub butter in lightly until mixture is crumbly, then knead until firm and smooth. Mould into two round flat cakes, pinch edges neatly, prick centres with fork prongs, mark into sections with knife, and bake on buttered trays in moderately hot oven for thirty to forty minutes until straw-coloured. Leave on trays until cold and crisp before storing in airtight containers.

Oaten Cheese Shortbread.

Ingredients: ½ lb. finely flaked oats or oatmeal, ¼ lb. self-raising flour, salt and cayenne, ¼ lb. finely grated cheese, 1 egg, paprika for sprinkling.

Method: Sift flour into basin, rub butter in lightly with fingertips, then add oats, grated cheese, and season with salt and cayenne. Mix with beaten egg to form a smooth short paste, press evenly into a buttered swiss roll pan, forming a thin layer, brush surface with milk or beaten egg, and sprinkle with paprika. Mark into finger-lengths and bake in moderately hot oven for twenty to thirty minutes. Cut into marked shapes, leave on tray until cold, then serve with curled celery or other savories.

Australian Shortbread.

Ingredients: 10 oz. rolled oats, ½ teaspoon salt, 4 oz. brown sugar, 4 oz. butter, 1 tablespoon golden syrup.

Method: Melt butter and syrup in saucepan, stir in sugar, salt, and rolled oats, mix well, and press into a buttered swiss roll pan, forming an even layer. Bake slowly in moderately hot oven for twenty to thirty minutes. Cut into required shapes while hot, leave on trays until cold, then store in airtight container.

Ginger Shortbread.

Ingredients: ½ lb. flour, ½ teaspoon baking powder, 1 teaspoon powdered ginger, 3 oz. sifted icing sugar, 4 oz. butter, 1 egg, ½ cup chopped preserved ginger, castor or icing sugar for sprinkling.

Method: Sift flour, salt, baking powder, powdered ginger, and icing sugar into basin and lightly rub in the butter. Moisten with beaten egg, forming a short paste. Knead until smooth, then press or roll to ¼-inch thickness. Place on buttered swiss roll tray, sprinkle with chopped ginger, and cut into triangles or other shapes. Bake slowly in moderately hot oven, until firm and lightly coloured, then sprinkle while hot with castor or icing sugar, and leave on trays until crisp and cold.

Chocolate Shortbread.

Ingredients: 3 oz. sifted icing sugar, 6 oz. butter, 1 egg, 3 tablespoons hot milk, 1 dessertspoon cocoa, 10 oz. flour, ½ teaspoon baking powder, pinch of salt, 2 tablespoons brown sugar, ½ cup seeded raisins, ½ cup chopped nuts or ground almonds.

Method: Mince the seeded raisins and mix with brown sugar and ground almonds or chopped nuts. Blend cocoa with hot milk and leave to cool. Cream butter and sifted icing sugar, gradually add beaten egg, milk, cocoa, sifted flour, baking powder, and salt. Knead until smooth and roll half the mixture thinly, to line a buttered swiss roll tin. Spread evenly with thin layer of raisin filling, cover with second portion of thinly rolled paste. Brush surface with milk or beaten egg, and either sprinkle with chopped nuts before baking or cover with thin layer of icing after cooking. Bake in moderately hot oven for about twenty minutes. cut while hot, and leave on trays until cold.

Shortbread Squares.

Ingredients: 7 oz. flour, pinch of salt, 1 oz. cornflour, 5 oz. butter, 3 oz. castor sugar, 1 egg, 2 oz. blanched chopped almonds.

Method: Cream the butter and sugar, add egg yolk, sifted flour, salt, and cornflour, mixing to a firm smooth paste. Press or roll and place in buttered swiss roll pan, forming a thin even layer. Pinch edges with thumb and finger, brush surface with egg white, and sprinkle with prepared almonds. Mark into small squares, bake slowly in moderately hot oven until firm and lightly coloured, then cut while hot and leave on tray until cold and crisp.

STRAWBERRY RECIPES.

Steamed Strawberry Sponge Pudding.

Mix together 5 oz. self-raising flour and a pinch of salt. Cream ¼ lb. each of butter and sugar, stir in two well-beaten eggs, and then gradually add a little milk. Sift in the flour. Have ready buttered a pudding basin or mould in which ½ lb. fresh strawberries have been packed, generously sprinkled with sugar. Pour in the sponge mixture, cover basin tightly and steam for 1½ hours. Serve with a sweet white sauce to which a few crushed berries have been added.

Strawberry Charlotte Meringue.

Line a buttered pie dish with fingers of sponge cake. Pour in on top of them ½ lb. freshly sieved strawberries, sweetened to taste. Then cover with the very stiffly beaten whites of three or four eggs, sprinkle with castor sugar, and bake in a very slow oven until the meringue is slightly browned. Serve with custard made from the egg yolks or with cream if available.

Pineapple Strawberry Meringue.

Peel large pineapple, with sharp knife cut out hard core entirely. Fill cavity with fresh strawberries, previously hulled, washed, and sprinkled with sugar. Place pineapple on side lengthwise in fireproof dish, cover it with meringue made by whipping whites of 4 eggs with 4 tablespoons sugar till stiff. Place in moderate oven, lower heat, and cook slowly till meringue hardens—about 1 hour. Serve cold with cream.

Strawberry Marmalade.

Take firm, ripe strawberries, wash and pick off stalks, then to each cup strawberries add cup sugar. Place in layers in bowls, putting thick layer strawberries first, then sugar, and so on until strawberries all are used. Allow stand two days, then put in preserving pan, cook gently until marmalade is thick. Remove from fire, add juice lemon to each 4 cupfuls marmalade. When cooked and bottled, the strawberries will be surrounded by thick, clear jelly.

Strawberry Shortcake.

For shortcake: 9 oz. self-raising flour (or plain with 4 level teaspoons baking powder); ½ level teaspoon salt, 3 dessertspoons castor sugar, 3 oz. butter, 1 egg, about ½ gill milk. Sift flour, salt into basin, rub in butter, add sugar. Beat up egg, stir it into mixture with sufficient milk to make soft dough. Grease deep sandwich tin. Turn dough on to lightly-floured board, roll to size of tin; place dough in tin, pressing lightly to make it fit. Bake in fairly hot oven about half hour. When cooked turn out carefully, leave on cake rack till cold. For filling: 1½ gill cream, about 1 lb. strawberries, ¼ lb. castor sugar, vanilla flavouring. Hull strawberries, cut in halves with stainless knife. Dredge with castor sugar; let stand while cake is cooking and cooling. Whisk cream till stiffens, sweeten with little sugar and flavour with vanilla. Split shortcake in half, spread layer cream over two cut sides, cover lower half with some of the prepared strawberries, put other half cake on top. Spread top with remainder cream, decorate with the rest of the strawberries.

IN THE FARM GARDEN.

IMPROVING SPRING FLOWERS.

DR. D. A. HERBERT.

AT this time of the year many of the spring annuals are in full bloom or putting out their buds, and a little attention will not only improve the individual size and quality of the flowers but prolong the flowering period. Briefly, there are three main ways of doing this—first, feeding the plants to provide for the increased drain on their resources during the flowering period; second, the removal of spent flowers so that the good material which would have gone to seed production is diverted to a new crop of flowers; and third, protection against distigurement and destruction by pests.

Liquid manure is simply plant food in a soluble form and which when put round a plant can be taken up and used almost immediately. All plant foods from the soil are taken up in solution, but some of the fertilizers are only slowly dissolved

and are slow in their action—bonedust as an example. Now, when a plant is coming into bud there is a considerable drain on its resources, and the provision of some quickly absorbed fertilizer is of great benefit. You will see this if you feed up some plants and leave a few alongside without manure for comparison.

The first thing is to decide on the liquid manure. Floraphos is excellent, but rather expensive. The three from which the choice is usually made are sulphate of ammonia, soot, and animal manure. Sulphate of ammonia is reasonably cheap, keeps indefinitely, and has no smell. A dessertspoon to a gallon of water makes a good nutrient solution, to be put round the plants at the rate of a gallon to the square yard, and the dose can be repeated at weekly intervals. The action of sulphate of ammonia is improved by the addition of about a third of the quantity of sulphate of iron—say a dessertspoon of sulphate of ammonia and a small teaspoon of sulphate of iron to the gallon. Sulphate of iron leaves a rust stain on clothing, so should be handled carefully.

Soot is another useful material, if it can be obtained. It can be spread round the plants in the dry form, when it acts as a deterrent for slugs, and the fertilizing materials are washed into the soil when it is watered. The most convenient way, however, is to soak a couple of dipperfuls in a bucket of water for a day or so. It is best put in a bag with a stone, as it does not sink very well when it is dry. Much of the value of soot lies in the ammonia it contains. Its disadvantage is that it is dirty stuff to handle: so this can be the consolation of those who cannot obtain it.

The orthodox liquid manure used by home gardeners is of animal origin—urine or manure in suitable dilution. Cow and sheep manure are the safest. They are soaked in a barrel or a bucket—about a pound of manure to the gallon—and left for about a week. For use the liquor is diluted down until it is about the colour of weak tea. For delicate plants such as maiden hair fern or cinerarias the solution can be made weaker, but the colour of weak tea generally indicates a suitable strength for ordinary annuals. There are two disadvantages of liquid animal manure—its smell and its attractiveness to flies; but there is no doubt about its beneficial effect on plants. It should be kept covered while it is fermenting. Urine has much the same effect and should be diluted 1 in 4 or 5 and applied at the rate of a gallon to the square yard. Fowl manure is much more concentrated than the others and should be diluted down much more.

So much for liquid manure. The second method of improving the flower crop is the systematic removal of spent flowers, and nothing needs to be said about that. If you are saving seed for next year, the best plants should be marked while they are in flower, as it is only by selection that the best varieties can be maintained. The casual collection of any seed that happens to have been produced anywhere in the garden is often the cause of unsatisfactory future crops. The flowering period is the best time for marking for destruction any poor types that are bound to appear from time to time and to prevent their multiplying up in future years.

The third point is protection against pests. Many of our annuals can be grown to perfection and then ruined by one of the innumerable pests just as they are coming into flower. Slugs are amongst the most annoying of these things. They do their damage at night and are hard to locate in the daytime. Hand picking at night with the aid of a torch helps to keep them down, but it is a tedious way of spending an evening. Trapping or baiting is much more satisfactory. Slugs are very fond of bran, and if small heaps are put round their haunts and a damp board or brick or even an upturned flowerpot left nearby, they will have their final feast, like condemned criminals, and then camp under the prepared shelter, to be collected next morning. Much better than this, however, is slug bait. Some years ago the amazing efficiency of metaldehyde in poisoning slugs was discovered, and this method has superseded the older types of poison such as Paris Green. Metaldehyde can be bought from hardware stores under the name of Meta fuel—a white substance in the form of tablets. One tablet is crushed and mixed thoroughly with a cup of bran and small heaps (about an eggcupful) are left round the haunts of the slugs. In wet weather the bait needs a cover. Ready-mixed bait can be bought in packets, but is more expensive than the home-made material. Meta should be kept out of the way of children, as the white tablets might be mistaken for lollies. The bait is a specific for slugs and snails and is not of value for controlling insects.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of years' records.	July, 1941.	July, 1940.		July.	No. of years' records	July, 1941.	July, 1940.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	1·13	40	0·73	0·90	Gatton College ..	1·40	42	0·48	0·11
Cairns	1·55	59	0·47	0·94	Gayndah	1·48	70	0·10	0·81
Cardwell ..	1·37	69	0·51	0·96	Gympie	2·09	71	0·24	0·93
Cooktown ..	0·97	65	1·20	2·28	Kilkivan	1·51	60	0·25	1·21
Herberton ..	0·88	55	0·53	0·63	Maryborough ..	1·95	70	0·23	1·11
Ingham	1·67	49	0·52	0·63	Nambour ..	2·72	45	0·30	2·86
Innisfail	4·77	60	1·86	3·98	Nanango	1·67	59	0·41	1·15
Mossman Mill ..	1·27	28	0·98	0·27	Rockhampton ..	1·74	70	0·15	0·61
Townsville ..	0·64	70	0·01	0·01	Woodford ..	2·35	54	0·36	0·86
Central Coast.					*Central Highlands.*				
Ayr	0·69	54	0·25	Nil	Clermont ..	1·05	70	0·40	Nil
Bowen	0·92	70	0·20	Nil	Gindie	1·08	42	..	Nil
Charters Towers ..	0·64	59	0·06	Nil	Springsure ..	1·19	72	0·18	Nil
Mackay P.O. ..	1·65	70	0·01	0·12	*Darling Downs.*				
Mackay Sugar Experiment Station	1·44	44	0·01	0·11	Dalby	1·72	71	0·75	0·43
Proserpine ..	1·54	38	0·06	0·03	Emu Vale ..	1·57	45	0·63	Nil
St. Lawrence ..	1·37	70	0·28	1·45	Hermitage ..	1·66	36	..	Nil
South Coast.					Jimbour	1·48	62	0·55	0·55
					Miles	1·62	56	0·39	0·44
Biggenden ..	1·42	42	0·20	0·35	Stanthorpe ..	2·00	68	0·82	0·13
Bundaberg ..	1·86	58	0·12	0·67	Toowoomba ..	2·07	69	0·97	0·16
Brisbane ..	2·19	89	0·64	0·32	Warwick ..	1·80	76	0·72	Nil
Caboolture ..	2·41	65	0·24	0·78	*Maranoa.*				
Childers	1·73	46	0·17	1·08					
Crohamhurst ..	2·95	48	0·33	2·18	Bungeworgoral ..	1·32	27	..	Nil
Esk	1·94	54	0·35	0·27	Roma	1·43	67	0·21	0·15

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—JULY, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg		Points.	
Cooktown	..	77	64	80	10	53	13	120	10
Herberton	..	70	45	75	5	28	12	53	3
Rockhampton	30·16	74	49	81	3	41	25, 27	15	1
Brisbane	30·15	70	48	78	16	41	28	64	3
Darling Downs.									
Dalby	..	67	36	74	14	26	25	75	2
Stanthorpe	..	60	31	66	15	22·1	27	82	5
Toowoomba	..	62	43	68	16	35	23	97	5
Mid-Interior.									
Georgetown	30·10	81	47	85	3, 4, 5, 15, 16	29	12	Nil	..
Longreach	30·19	76	41	83	3, 4	34	12	Nil	
Mitchell	30·22	67	33	75	1, 4, 15	25	27, 28	47	1
Western.									
Burketown	..	81	50	90	20	38	12	Nil	..
Boulia	30·18	73	43	84	3	36	11	Nil	..
Thargomindah ..	30 20	67	39	74	14	32	11	..	..

ASTRONOMICAL DATA FOR QUEENSLAND
OCTOBER, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON.
AT WARWICK.

Oct.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	p.m.	a.m.
1	5.33	5.53	2.10	2.42
2	5.32	5.53	3.7	3.25
3	5.30	5.53	4.1	4.4
4	5.28	5.53	4.55	4.42
5	5.27	5.53	5.48	5.17
6	5.26	5.54	6.41	5.52
7	5.25	5.55	7.32	6.27
8	5.25	5.56	8.24	7.6
9	5.23	5.57	9.15	7.44
10	5.22	5.57	10.5	8.24
11	5.21	5.58	10.55	9.9
12	5.20	5.58	11.43	9.55
13	5.19	5.59	nil	10.44
			a.m.	
14	5.17	5.59	12.29	11.37
				p.m.
15	5.16	6.0	1.15	12.32
16	5.15	6.1	1.58	1.29
17	5.14	6.1	2.41	2.28
18	5.13	6.2	3.23	3.30
19	5.12	6.2	4.6	4.33
20	5.11	6.3	4.50	5.39
21	5.10	6.4	5.36	6.46
22	5.9	6.4	6.25	7.52
23	5.8	6.5	7.17	8.58
24	5.8	6.6	8.12	10.1
25	5.7	6.6	9.9	11.0
26	5.6	6.7	10.8	11.53
27	5.5	6.7	11.7	nil
			p.m.	a.m.
28	5.4	6.8	12.5	12.41
29	5.3	6.9	1.2	1.25
30	5.2	6.9	1.58	2.5
31	5.1	6.10	2.51	2.42

Phases of the Moon.

5 October, Full Moon, 6.32 p.m.
13 „ Last Quarter, 10.52 p.m.
21 „ New Moon, 12.20 a.m.
27 „ First Quarter, 3.4 p.m.

THE WORLD NEAREST THE SUN.

THE most interesting planet to watch during the early part of this month is Mercury. It appears high and bright above the western horizon at dark and does not set until nearly 8 o'clock. In England, few people ever see Mercury, and it is said, that the great astronomer Copernicus, who lived in Poland, never saw it. In high latitudes Mercury never appears far above the horizon. Mercury will be at its highest on 3rd October. Excepting Venus, it appears as the brightest "star" in the west. While looking at the planet, it is interesting to remember that this little world is but 3,000 miles in diameter. Its average distance from the sun being only 36 million miles, the solar heat there would be about seven times greater than it is here. As it always keeps one hemisphere toward the sun, as the moon does to the earth, the temperature on the sunny side would be sufficient to melt lead or tin. Little can be seen of Mercury, but it is thought to be in a very similar condition to the moon—without atmosphere, waterless (and, therefore cloudless, and with a surface of bare mountain peaks and plains of tumbled rock.

THE SHEPHERDS' STAR.

Well above Mercury is Venus, the Evening Star, sometimes called the Shepherds' Star by French sheepmen. It is the most brilliant of all the planets or stars. Venus was behind the sun in April, but is now coming toward us on its circular path round the sun. Next month it will appear at its highest in the sky, but although afterwards it will set earlier, its brilliancy will increase until after Christmas, when it will give enough light to throw shadows upon the earth in places far from city lights. Venus is much larger than Mercury. It is almost as large as the earth, and is sometimes our nearest neighbour. It is rather tantalising, however, to think that when at its nearest it is between us and the sun, and cannot be seen. When we can see it, its surface is always veiled with dense clouds so that we know nothing about its physical features. We do not know the length of its day or the position of its poles.

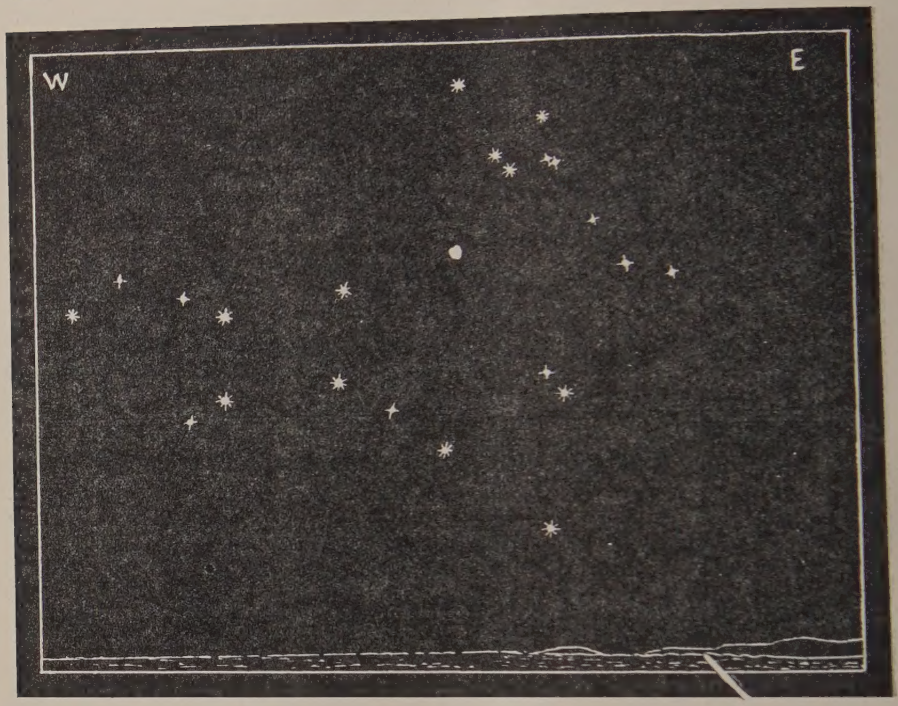
Beyond the earth, from the sun, is Mars. Beyond that is Jupiter, the first of the giant planets, and then comes Saturn. Saturn rises first, about 9.30 p.m., near the Pleiades. Two hours later Jupiter comes up, north of Orion. Both of these great planets are growing brighter as they approach the earth. Jupiter is 435 million miles from us at present. This great distance dwarfs, to the size of a star, a world so large that it could contain 1,300 earths. Like Venus, Jupiter is for ever enshrouded by dense clouds, but the clouds of Jupiter are always in a state of turmoil and are rich in colour. They are formed into belts north and south of its equator, and in some of them rows of black or white spots appear at times.

SHORT DAYS ON JUPITER.

There are markings on Jupiter which are semi-permanent, and from these the length of a day and night up there is found to be only about 10 hours.

Saturn is the next planet beyond Jupiter; the farthest world which can be seen by the naked eye. It is not as large as Jupiter, although 760 earths could be stowed away within its mighty globe. Saturn is much less brilliant than Jupiter, shining with a rather dull yellow light. Its globe has cloud belts, but at its great distance—787 million miles at the beginning of October—they appear very faint. What is seen well is Saturn's unique system of rings, which stretch outward, like a great platform, 48,500 miles wide. On such a platform, six worlds like ours could roll abreast. However, it is not solid, but probably composed of innumerable fragments of rock, all revolving round the great globe in their own orbits. Once upon a time, perhaps, these rings formed a moon which, for some reason moved in too near the great planet, whose enormous gravitational pull gradually dragged it to pieces.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.



LOOKING NORTH AT MIDNIGHT.

Midnight is far too late for most country folk to go star-gazing. But the Red Planet, Mars, will be on the meridian—a line from over the observer's head due north—at midnight, at its brightest and almost at its nearest to the earth on 10th October. It may be interesting, therefore, to show him and the neighbouring stars. As Mars reaches the meridian at midnight, he may be seen all the evening, with the surrounding stars, climbing the eastern sky, shining with his well-known ruddy hue, brighter than any of his neighbours. Mars is shown as a round dot a little above the centre of the picture. West of Mars is Pegasus, the Winged Horse, his curved neck stretching, almost to the edge of the picture. The four stars forming his body comprise the Great Square of Pegasus. From the north-east corner a line of three stars forms Andromeda. The constellation east of Mars is Cetus, the Sea Monster. Between Cetus and Andromeda are the two chief stars of Aries, the Ram.

MARS—OUR NEXT DOOR NEIGHBOUR.

Owing to the peculiar motion of the earth and Mars, it is only once in nearly two years and two months that he comes into opposition to the sun. Mars will be at its nearest to us on 3rd October when the distance will be 38,133,000 miles. Sometimes the Red Planet comes within 34 million miles; that happened in 1924. He came fairly close in 1938, within 36¾ million miles. Mars is 4,215 miles in diameter, but at this great distance he only appears as a point of reddish light. In a small telescope, however, a distinct disc is seen; in large telescopes markings appear and on photographic plates much fine detail is imprinted. At the 1938 opposition, 8,000 plates were taken with a special camera and the 27-inch refracting telescope, at the observatory at Bloemfontein. A great amount of detail was found upon the plates and some of the features seem to have changed in shape from the previous opposition. It is in this way that astronomers keep an eye on our neighbouring world. Mars is the only planet whose solid surface we can study, as its atmosphere is, to a large extent, free of clouds. From these markings the Martian day is found to be 24 hours 37 minutes.

Girdling the planet, roughly within its tropics, are irregular grey or greenish regions; most of the remainder of the planet being of a reddish hue, which has caused Mars to be called the Red Planet.

MELTING SNOWFIELDS.

At each pole there are white caps, quite likely of snow. These polar caps dwindle as the Martian spring advances, and sometimes disappear toward the end of the summer. The reddish regions are thought to be sandy deserts and are almost featureless. The most interesting are the greenish tinted parts which girdle the planet. Much detail, considerable seasonable changes, and a wealth of colour are observed in large areas. According to some astronomers these seasonable changes are very similar to what might be expected from the seasonal surge and decline of life in vegetation. If it is vegetation, it may be very different to what we know upon the earth, perhaps only a smear of lichen upon the Martian rocks, or it may be of more luxuriant growth. These darker areas were once thought to be seas, but it is fairly certain that there are no large bodies of water on the planet. Cloud or mist is sometimes seen and the dark areas have probably a moister climate than the reddish country. The world has an atmosphere in which clouds float, but it is not nearly as dense as ours, and it is considered that life, such as we know it, could not exist there. The temperature, even at the equator, is very cold. At midday a thermometer may rise a little above 50° Fahr., but at sunset it would drop below freezing point and the nights must be very cold indeed.